Sound Card Digital Modes on Winlink Express

WINLINK
Global Radio Email SM

WHAT WINLINK OFFERS FOR EMCOMM

Flexibility:

- Internet-only (Telnet) direct connections to Winlink.
- Radio link bridge to Internet e-mail.
- Radio-only store and forward messaging.
- Peer-to-peer connections between radio end-users.
- Familiar and simple e-mail client interface.

Interoperability: Connect different types of systems

- Bridge different radio capabilities (VHF/UHF/HF).
- Seamless integration with Internet e-mail.

Geographical dispersion and redundancy for reliability

WHAT WINLINK OFFERS FOR EMCOMM (MORE)

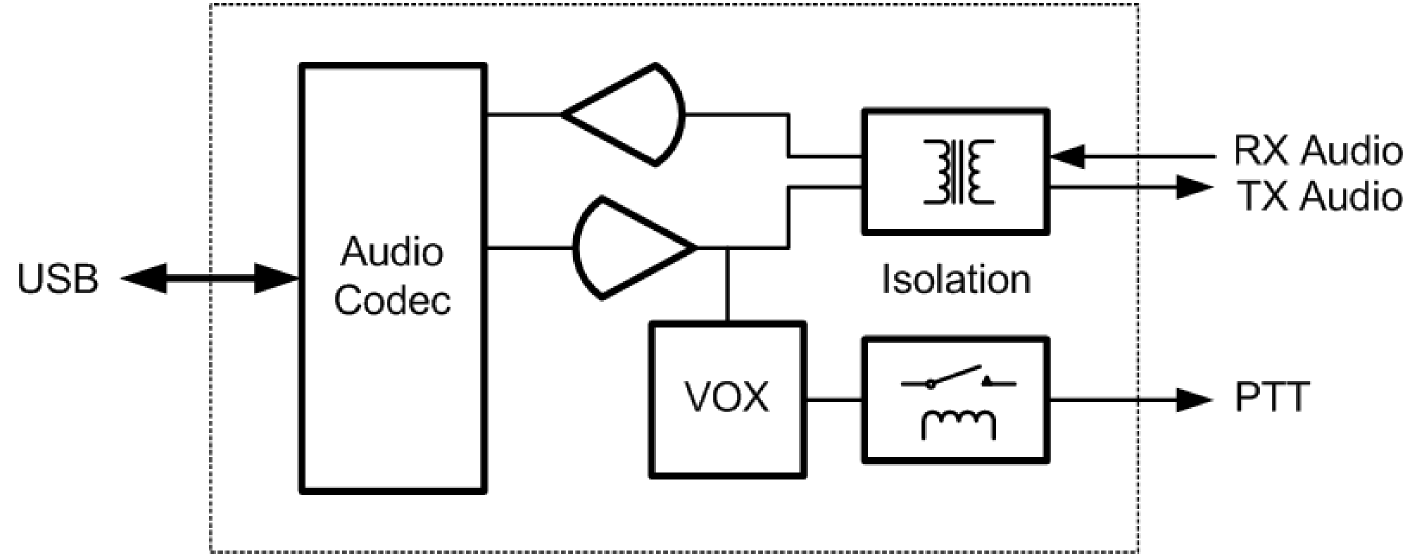
- Standard e-mail format with many features.
    - Binary file attachments (pictures, pdf, spreadsheets).
    - Automatic message compression/decompression.
    - White listing used to prevent spam.
- Time independence.
- Ability to collect messages while unattended.
- Good operation at most power levels.
- Not limited by station-to-station propagation.
- Message logging, and ICS report generation.
- Forms and template support.
- Wide adoption by EmComm related agencies.

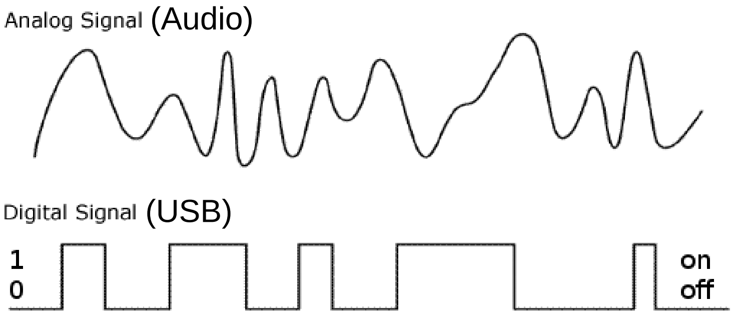
WHY SOUND CARD DIGITAL?

Flexibility and Performance:

- Most Winlink modes are available using only a sound card interface (Packet, ARDOP, Winmor, Vara, Vara FM)
- Less expensive hardware options
- Superior decode performance over hardware devices
- Not limited to just Winlink, other weak signal and experimental modes require a sound card interface (WSJT, WSPR, FT8, etc.)

SOUND CARD INTERFACE BLOCK DIAGRAM





SOUND CARD OPERATION

Interface:

- Basically a simple signal interface, it is *not* a TNC
- Provides ground isolation between radio and computer
- Provides Push To Talk (PTT) signal
- Does not process the modem signals
- Signal processing is done by software running on the host
- May include additional ports for rig control

Host Software:

- Does signal processing (modulation/demodulation)
- Provides timing of data and control signals
- Implements the data protocol

SOUND CARD OPERATION

WINLINK EXPRESS MODES

Mode	Speed	Application
Winmor (HF)	Up to 1300bps	Built-In
ARDOP (HF)	Up to 4,000bps	Built-In
Vara (HF)	Up to 7,000bps	External
Packet (V/UHF)	1200/9600bps[1]	External
Vara FM (V/UHF)	Up to 17,957bps	External

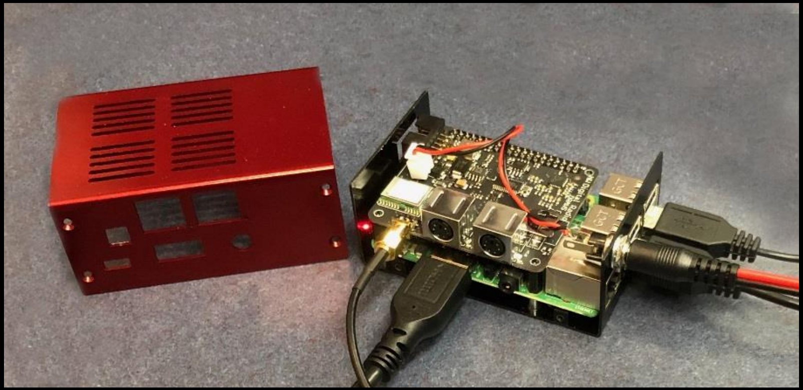
- Both Winmor and ARDOP were developed by the WDT and are built-in to Winlink Express
- Vara and Packet modes are provided by external applications:
  - Vara (HF) and Vara FM (V/UHF)
  - UZ7HO Soundmodem (V/UHF Packet)
  - Direwolf (V/UHF Packet)

1. Both Soundmodem and Direwolf provide additional PSK modes between 1200 and 9600

SIGNALINK SOUNDCARD INTERFACE

- Simple device powered by USB connection.
- Cost is about $100 including radio-specific cable.
- Radio needs to have a data (sound) port, or use microphone and speaker connections.
- Some modes need to run an external application like Direwolf or UZ7HO soundmodem (for packet) or Vara FM.

OTHER SOUNDCARD INTERFACES



NWDR DRAWS™

Masters Communications RA-40

Various interfaces designed around USB codec chips (C-Media or others). Some are kits, pre-built, or DIY. Many AllStar interfaces can be found and work fine for digital (may be PTT issues).

NS7C Modified USB fob

RESOURCES NEEDED FOR WINLINK EXPRESS

HF Winmor/ARDOP/Vara

- Windows computer, Windows 7 – 10
- Winlink Express
- HF radio with data (sound) port or built-in sound card
- Optional computer control port (CI/V, CAT for rig control)
- SignaLink or similar USB soundcard interface
- Appropriate cables to connect interface to radio
- All software is free (except Vara), but donation is suggested

Note, Winlink Express does not run under Linux or MacOS

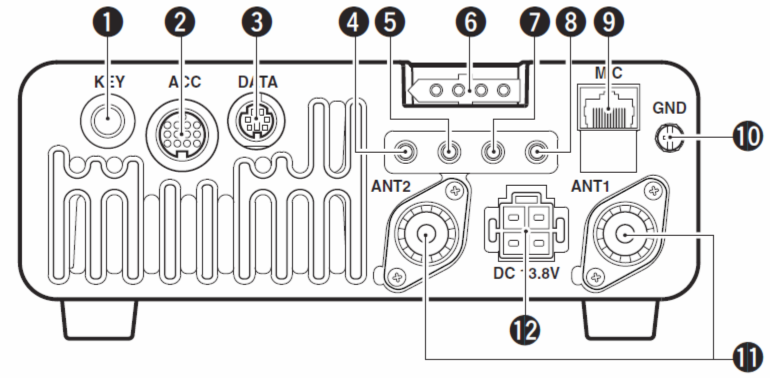
RESOURCES NEEDED FOR WINLINK EXPRESS

V/UHF Packet/Vara FM

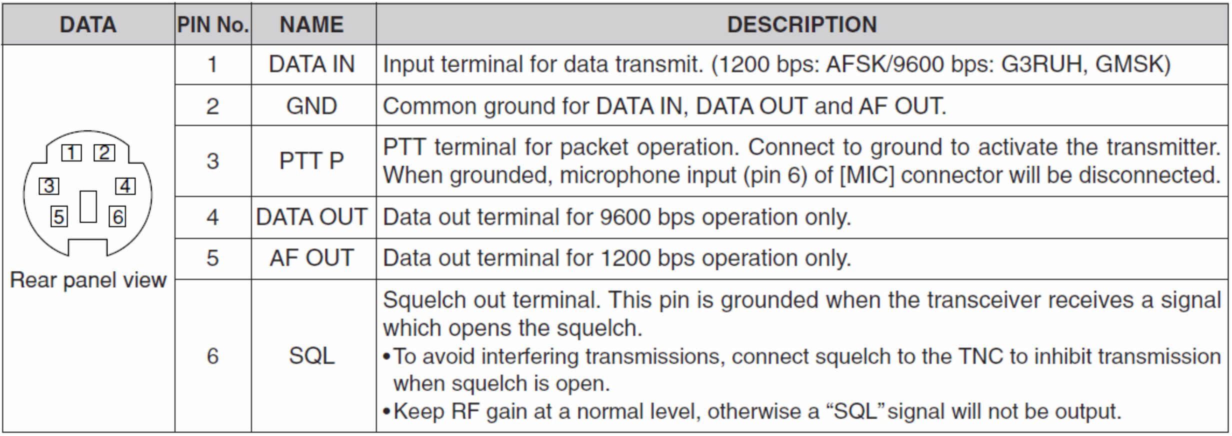
- Windows computer, Windows 7 – 10
- Winlink Express
- V/UHF radio with data (analog) port or speaker and mic jack
- SignaLink or similar USB soundcard interface
- Appropriate cables to connect interface to radio
- External application, Soundmodem, Direwolf, Vara FM
- All software is free (except Vara), but donation is suggested

Vara registration is $69/call or $50/call for groups of 10 or more

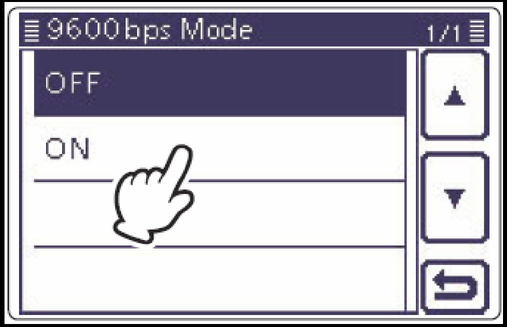
HARDWARE CONNECTIONS



- Data Jack, poor name, but standard
- ACC jack varies by manufacturer
- 1200/9600bps doesn't really mean that
- CI-V, Cat varies by manufacturer
- Switching between 1200 and 9600 operation also requires menu changes



DATA	PIN No.	NAME	DESCRIPTION
Rear panel view	1	DATA IN	Input terminal for data transmit. (1200 bps: AFSK/9600 bps: G3RUH, GMSK)
	2	GND	Common ground for DATA IN, DATA OUT and AF OUT.
	3	PTT P	PTT terminal for packet operation. Connect to ground to activate the transmitter. When grounded, microphone input (pin 6) of [MIC] connector will be disconnected.
	4	DATA OUT	Data out terminal for 9600 bps operation only.
	5	AF OUT	Data out terminal for 1200 bps operation only.
	6	SQL	Squelch out terminal. This pin is grounded when the transceiver receives a signal which opens the squelch. • To avoid interfering transmissions, connect squelch to the TNC to inhibit transmission when squelch is open. • Keep RF gain at a normal level, otherwise a "SQL" signal will not be output.



9600bps Mode 1/1

OFF

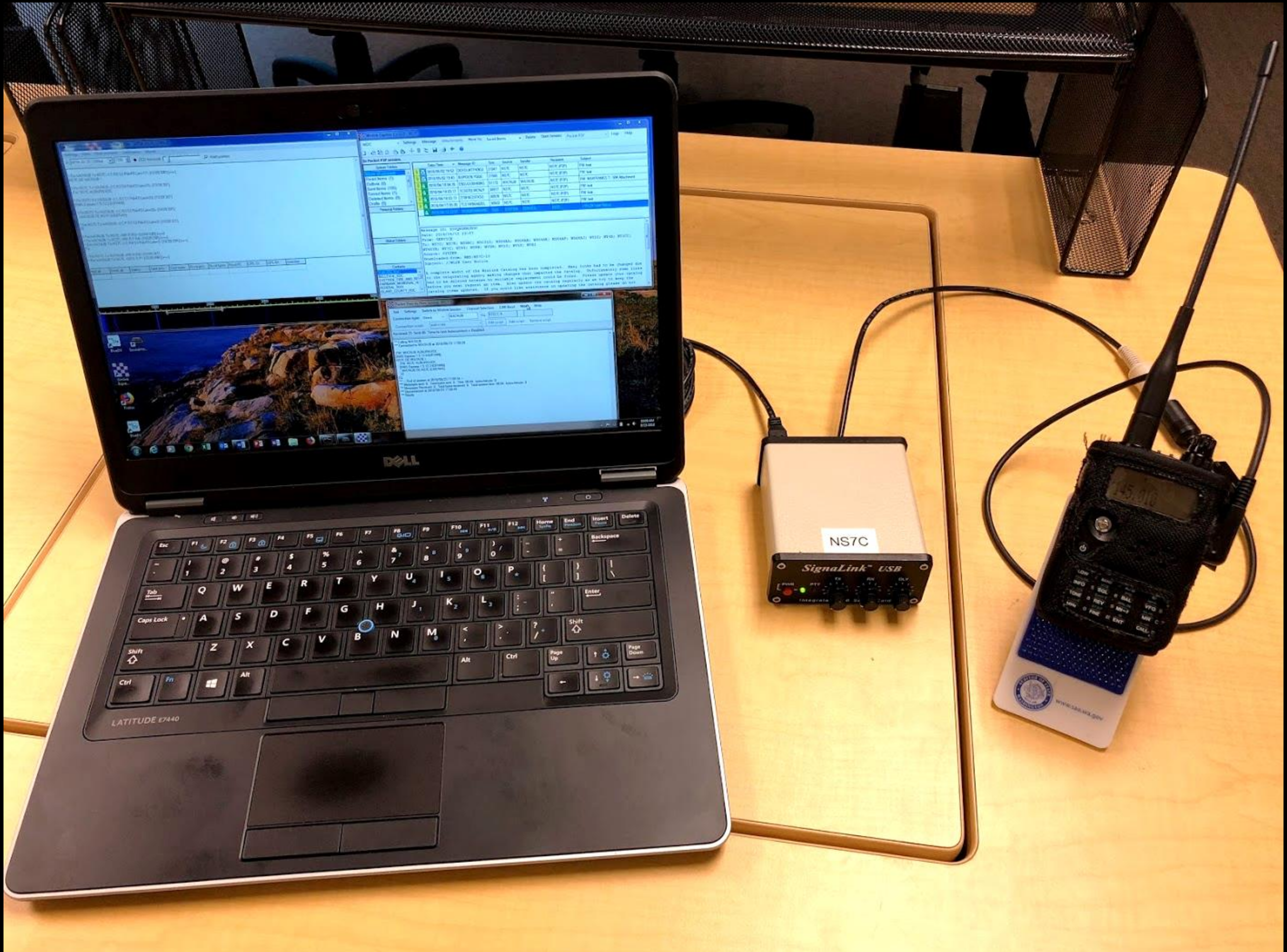
ON

HARDWARE CONNECTIONS

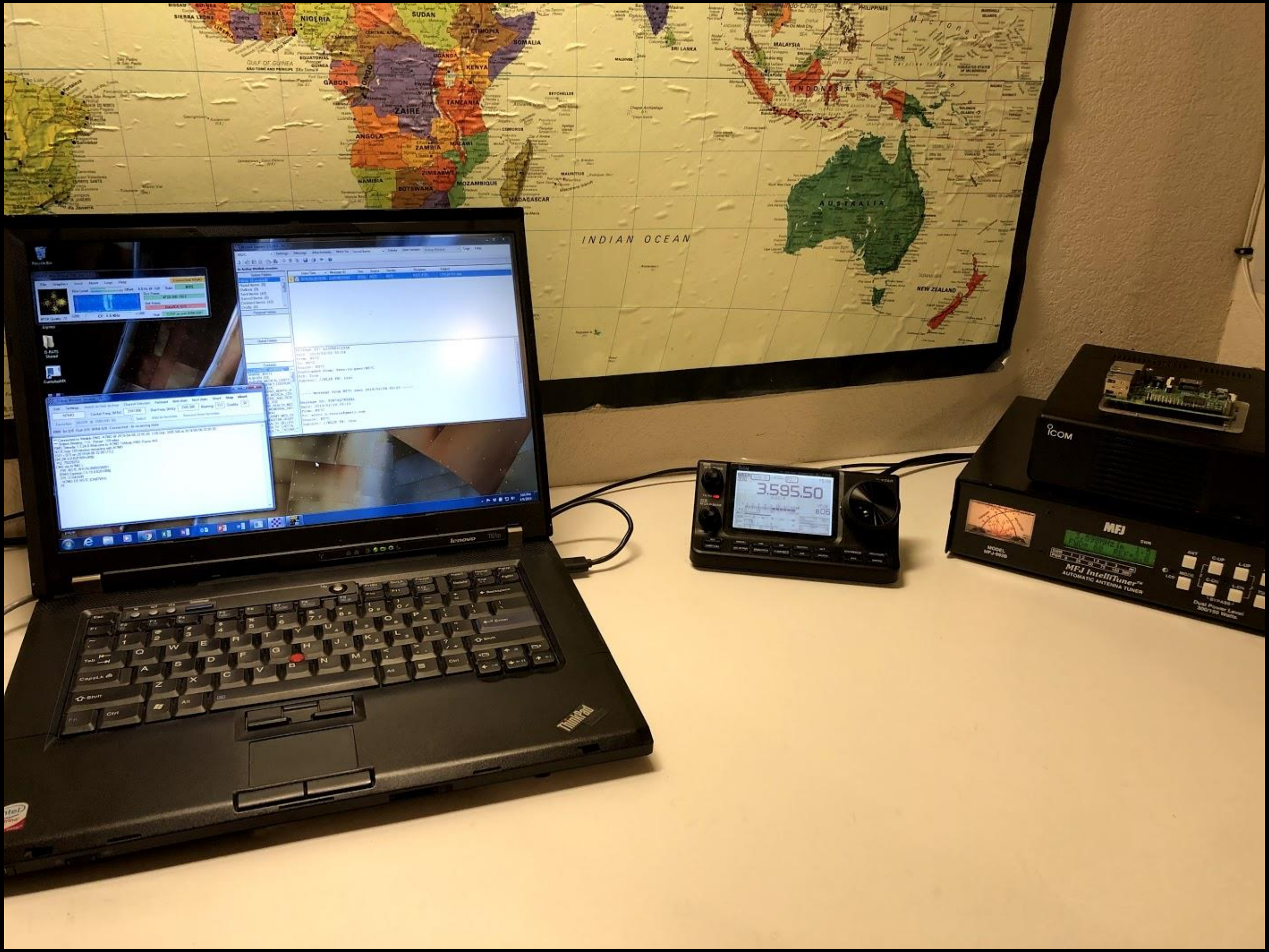
Data Jack (6-Pin DIN connector) explained:

- Used for analog signals, not digital data
- Not really related to 1200 or 9600 bps data
- 1200 connections go through the regular “voice” path in the radio, including pre/de-emphasis. Audio Bandwidth is limited to about 3kHz.
- 9600 connections go direct to the modulator and discriminator. Greater audio bandwidth is possible, maybe up to 6kHz (in theory).
- Pin assignments are standard, however, impedance and voltage levels are not! Some manufacturers do not even document what is expected at this jack.

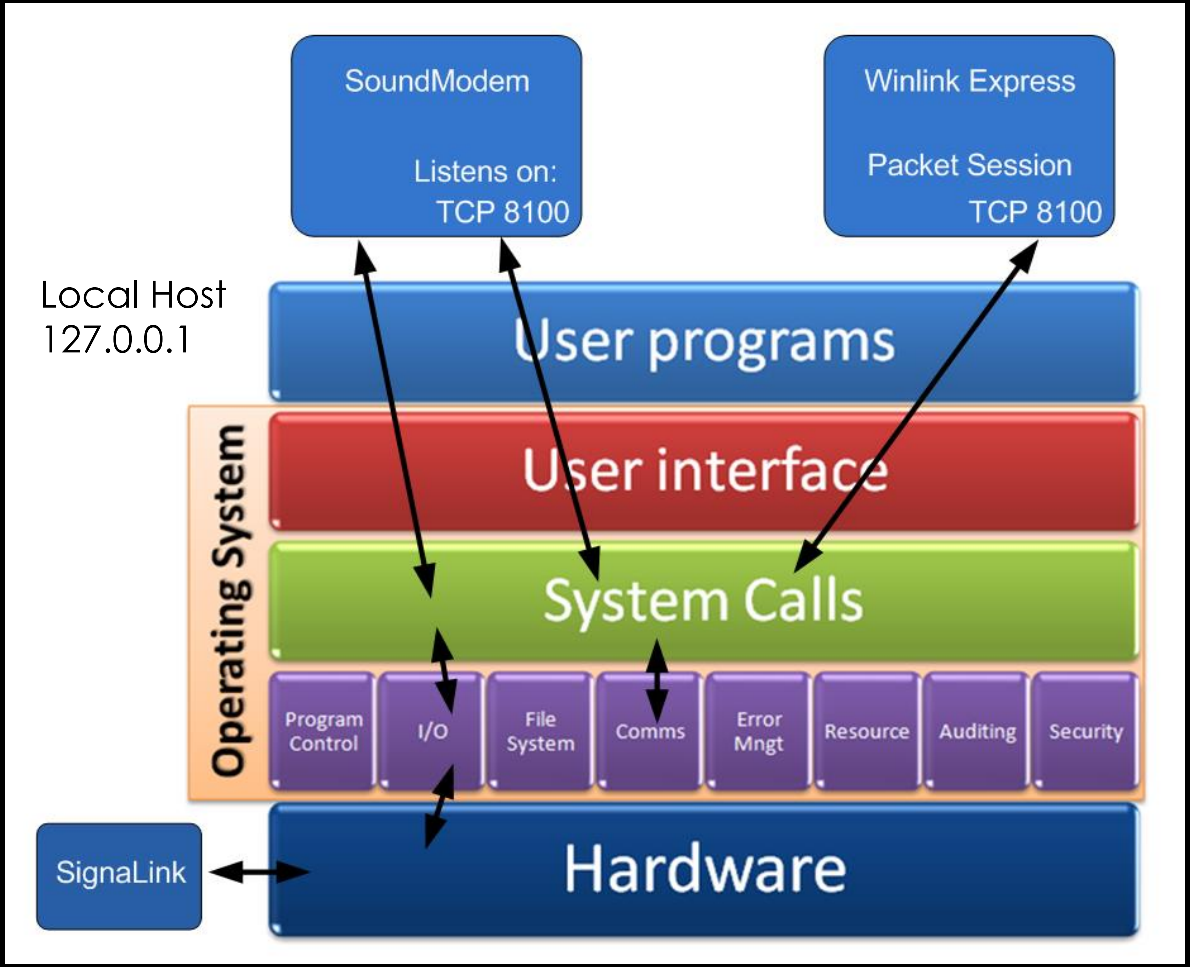
HARDWARE CONNECTIONS



HARDWARE CONNECTIONS



SOFTWARE CONNECTIONS



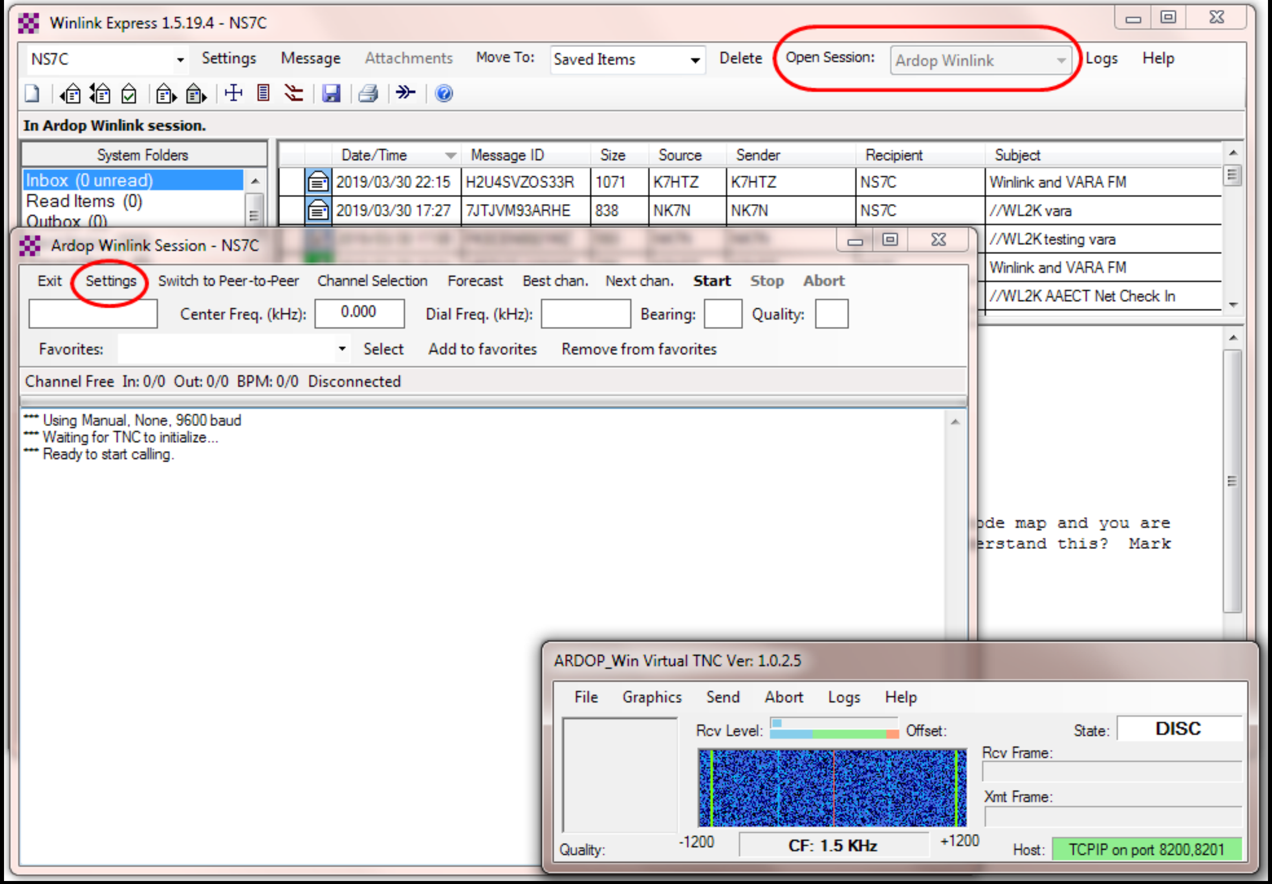
Programs communicate using the OS network stack via TCP ports.

Communication stays within the system and does not go out on the LAN or the Internet.

Port numbers must match and must not conflict with other programs.

SOFTWARE SETUP

ARDOP/WINMOR HF



In Ardop Winlink session.

Date/Time	Message ID	Size	Source	Sender	Recipient	Subject
2019/03/30 22:15	H2U4SVZOS33R	1071	K7HTZ	K7HTZ	NS7C	Winlink and VARA FM
2019/03/30 17:27	7JTJVM93ARHE	838	NK7N	NK7N	NS7C	//WL2K vara
						//WL2K testing vara
						Winlink and VARA FM
						//WL2K AAECT Net Check In

Center Freq. (kHz): 0.000

Dial Freq. (kHz):

Bearing:

Quality:

Favorites:

Channel Free In: 0/0 Out: 0/0 BPM: 0/0 Disconnected

```
*** Using Manual, None, 9600 baud
*** Waiting for TNC to initialize...
*** Ready to start calling.
```

```
ode map and you are
erstand this?  Mark
```

State: DISC

CF: 1.5 KHz

Host: TCPIP on port 8200,8201

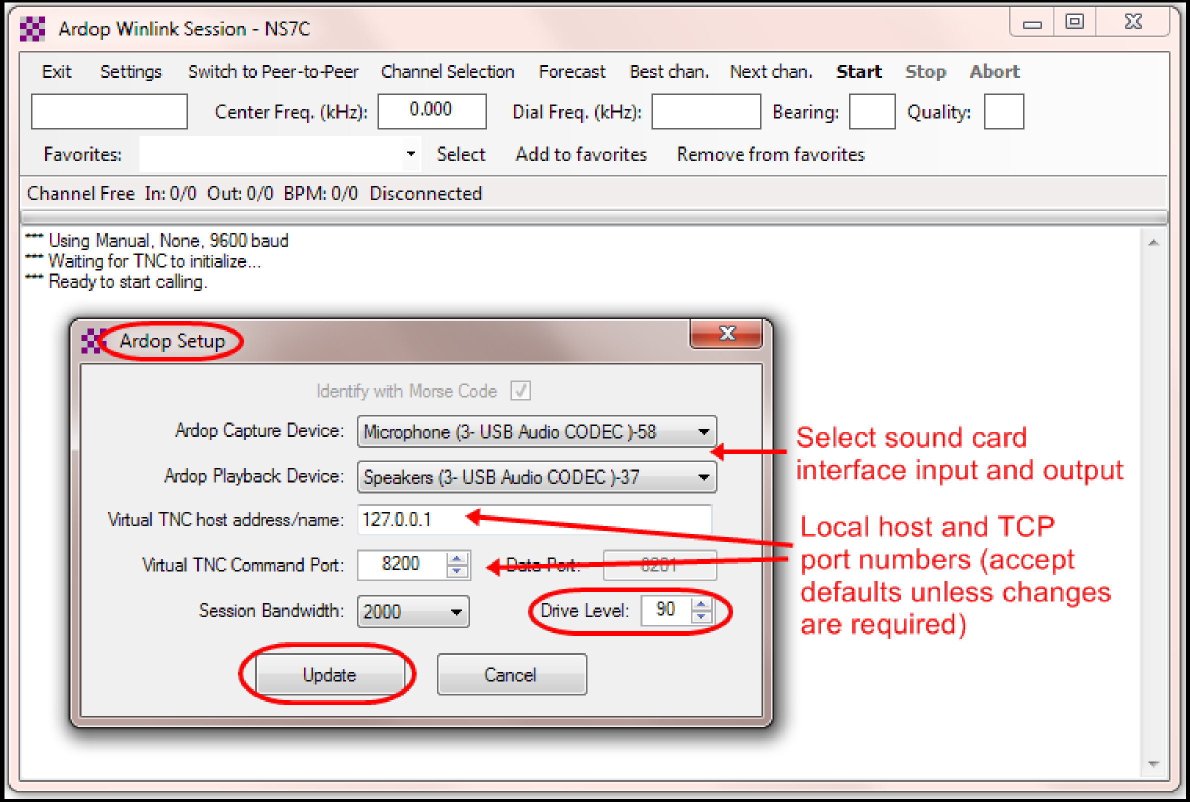
In Winlink Express, open the session to be configured.

Within the session window, select the Settings option to configure interface, ports and other settings.

Some settings will carry over to other session types.

SOFTWARE SETUP

ARDOP/WINMOR HF



Ardop Winlink Session - NS7C

Center Freq. (kHz): 0.000
Dial Freq. (kHz):
Bearing:
Quality:
Favorites:

Channel Free In: 0/0 Out: 0/0 BPM: 0/0 Disconnected

```
*** Using Manual, None, 9600 baud
*** Waiting for TNC to initialize...
*** Ready to start calling.
```

Ardop Setup

Identify with Morse Code ☑
Ardop Capture Device: Microphone (3- USB Audio CODEC)-58
Ardop Playback Device: Speakers (3- USB Audio CODEC)-37
Virtual TNC host address/name: 127.0.0.1
Virtual TNC Command Port: 8200
Data Port: 8201
Session Bandwidth: 2000
Drive Level: 90

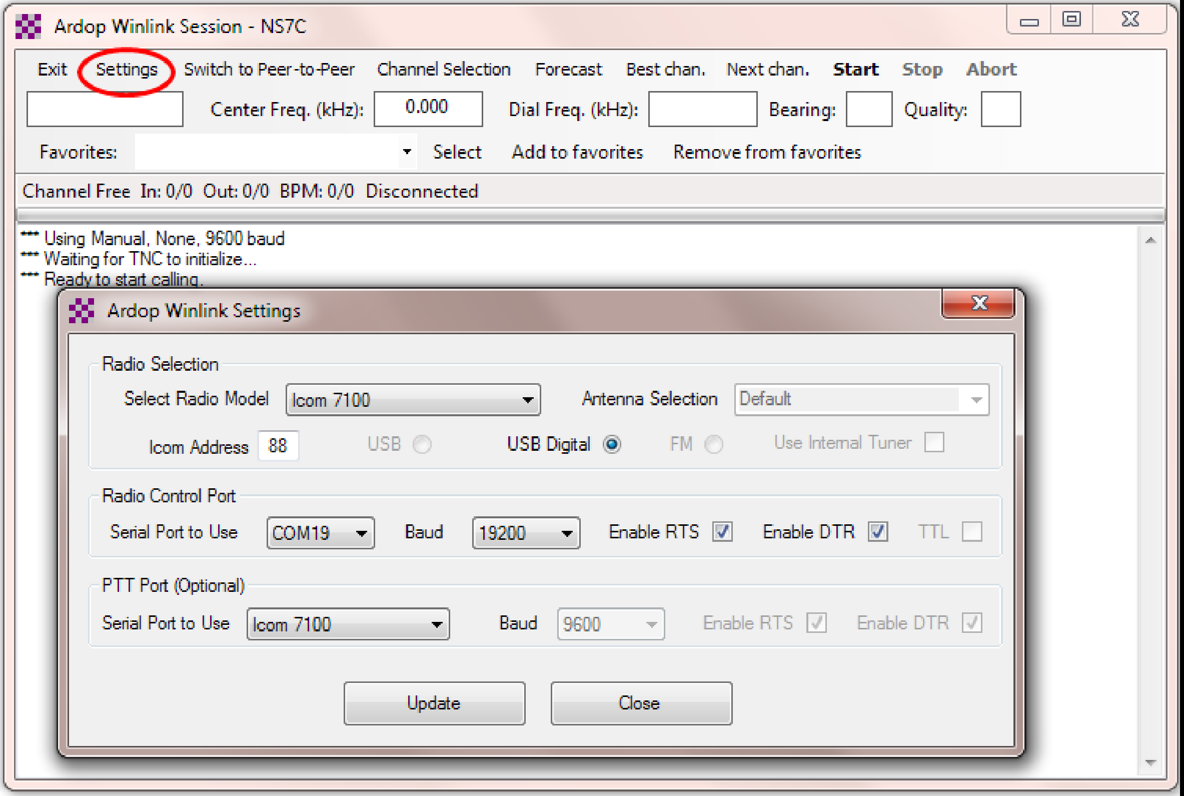
Select sound card interface input and output

Local host and TCP port numbers (accept defaults unless changes are required)

Select the sound card interface, check that port numbers do not conflict with other applications that may be running, and select Update when complete.

SOFTWARE SETUP

ARDOP/WINMOR HF



Center Freq. (kHz): 0.000
Dial Freq. (kHz):
Bearing:
Quality:
Favorites:

Channel Free In: 0/0 Out: 0/0 BPM: 0/0 Disconnected

```
*** Using Manual, None, 9600 baud
*** Waiting for TNC to initialize...
*** Ready to start calling.
```

Radio Selection
Select Radio Model: Icom 7100
Antenna Selection: Default
Icom Address: 88
USB ○ USB Digital ● FM ○ Use Internal Tuner ☐

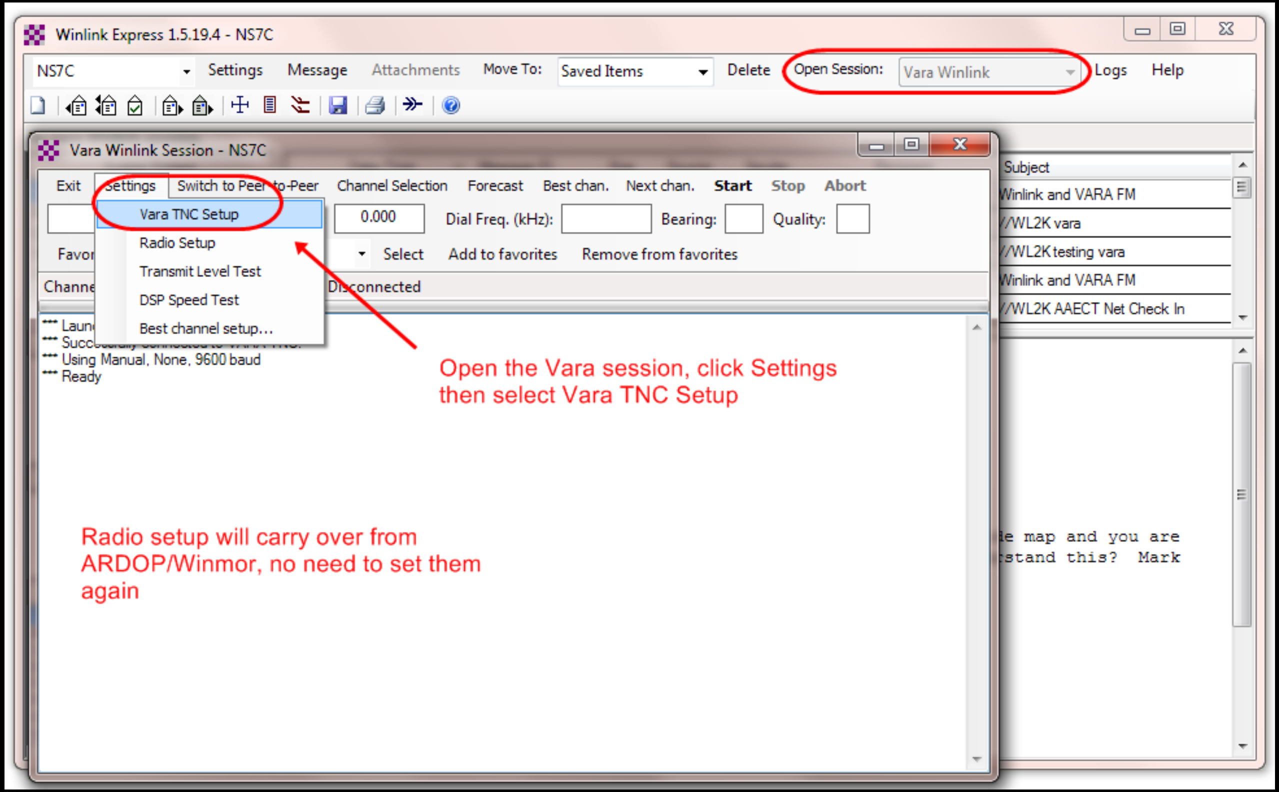
Radio Control Port
Serial Port to Use: COM19
Baud: 19200
Enable RTS ☑ Enable DTR ☑ TTL ☐

PTT Port (Optional)
Serial Port to Use: Icom 7100
Baud: 9600
Enable RTS ☑ Enable DTR ☑

These settings are for rig control (frequency and mode), and will vary depending on manufacturer and radio menu settings.

SOFTWARE SETUP

VARA HF



```
*** Laun
*** Succ
*** Using Manual, None, 9600 baud
*** Ready
```

```
e map and you are
stand this?  Mark
```

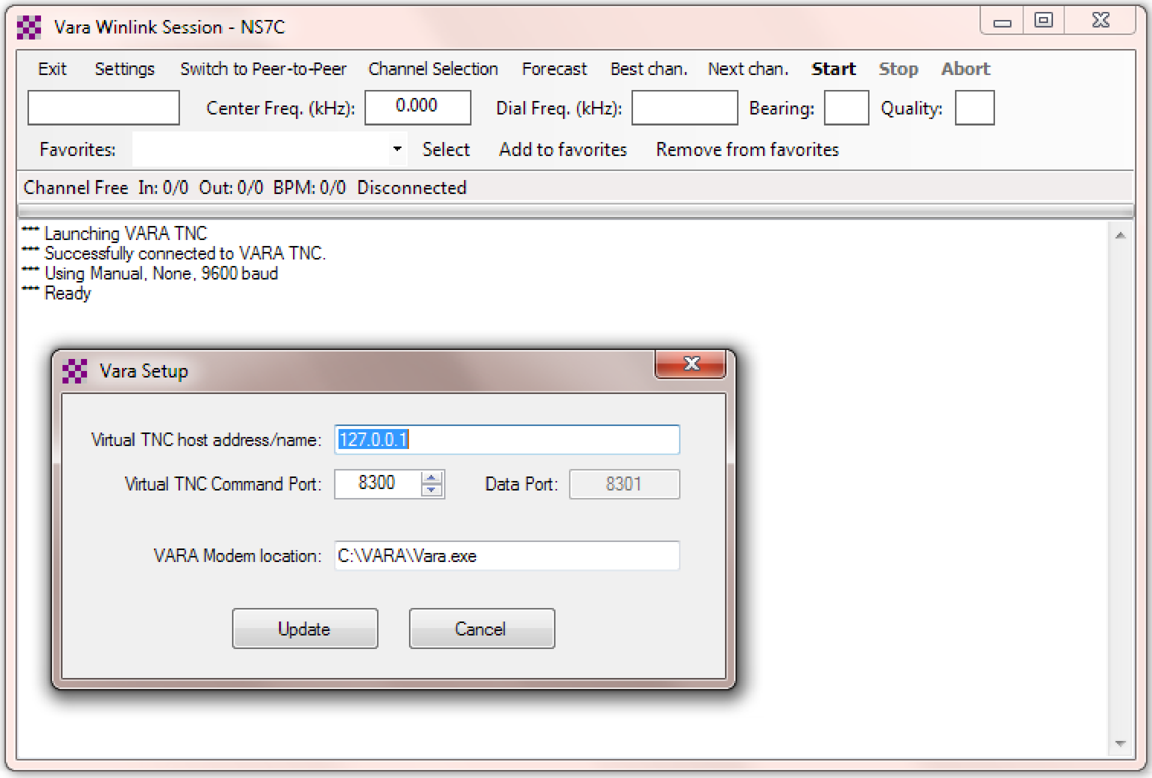
Open the Vara session, click Settings then select Vara TNC Setup

Radio setup will carry over from ARDOP/Winmor, no need to set them again

Open a Vara session, then select Settings and Vara TNC Setup. If Vara is not found on the computer in the default location, you will be given a link to the download page for Vara. The radio setup will carry over from ARDOP or Winmor if you have already setup those sessions.

SOFTWARE SETUP

VARA HF



Center Freq. (kHz): 0.000
Dial Freq. (kHz):
Bearing:
Quality:
Favorites:

Channel Free In: 0/0 Out: 0/0 BPM: 0/0 Disconnected

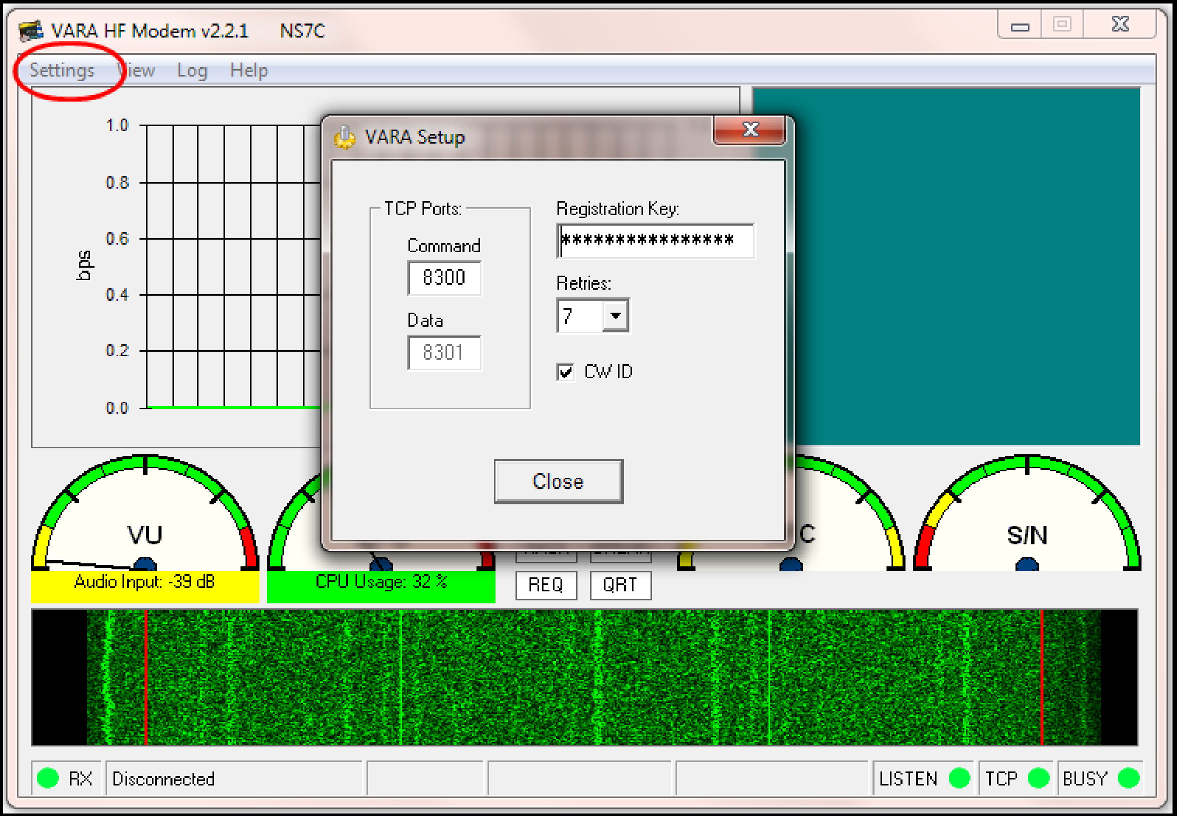
```
*** Launching VARA TNC
*** Successfully connected to VARA TNC.
*** Using Manual, None, 9600 baud
*** Ready
```

Virtual TNC host address/name: 127.0.0.1
Virtual TNC Command Port: 8300
Data Port: 8301
VARA Modem location: C:\VARA\Vara.exe

Again, accept the defaults of local host and port 8300/8301 unless you need to make a change.

SOFTWARE SETUP

VARA HF



VARA Setup

TCP Ports:

Command: 8300

Data: 8301

Registration Key: ****************

Retries: 7

☑ CW ID

Audio Input: -39 dB

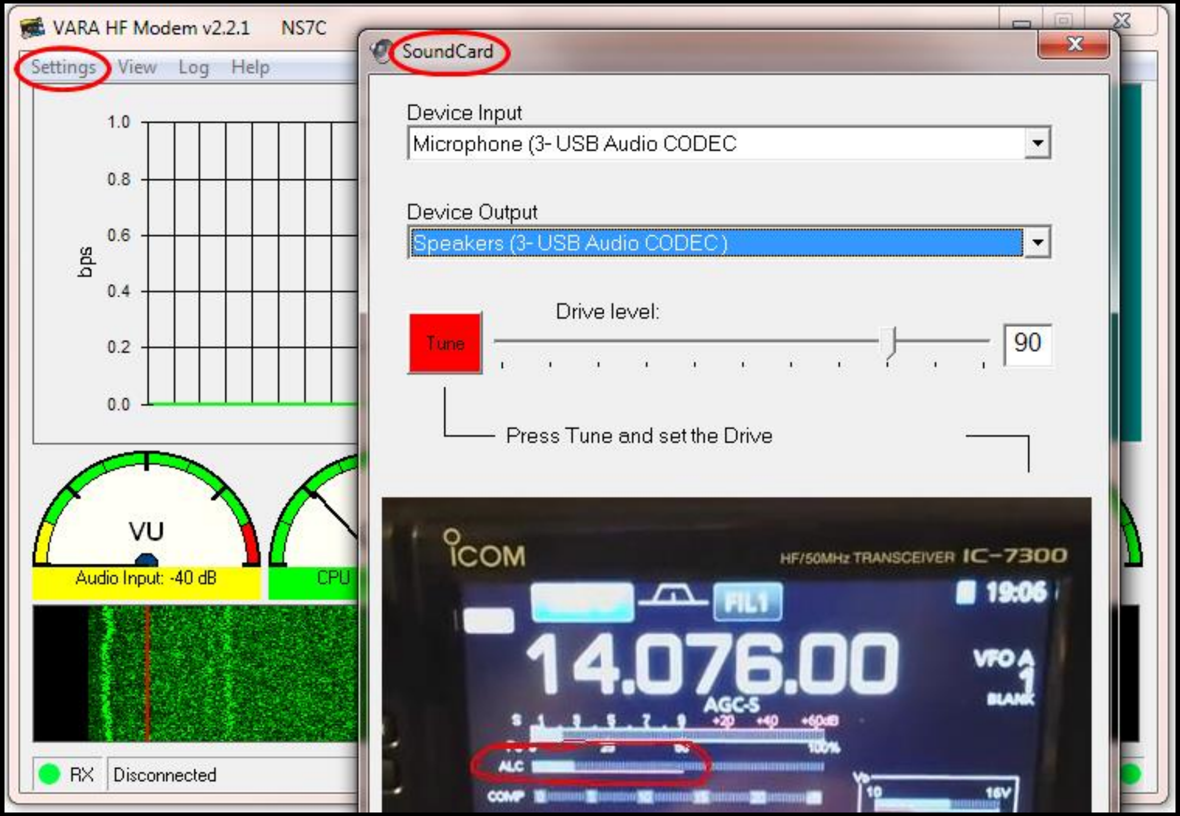
CPU Usage: 32 %

Disconnected

Bring up the Vara TNC (it starts minimized), select settings and Vara Setup. Make sure the ports match the Winlink Session. Add your registration key and set retries to at least 7. CWID is optional but suggested.

SOFTWARE SETUP

VARA HF



Device Input
Microphone (3- USB Audio CODEC

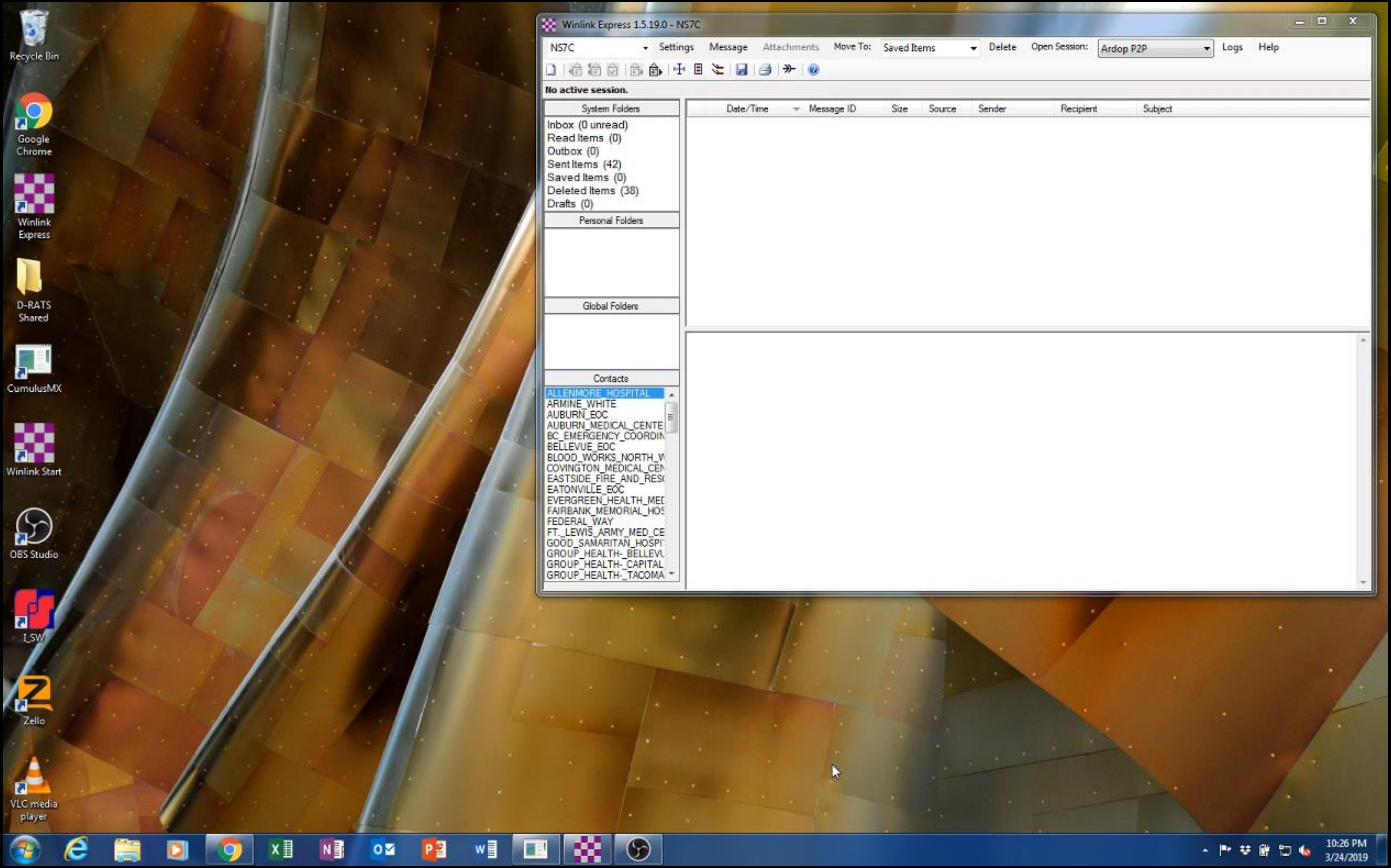
Device Output
Speakers (3- USB Audio CODEC)

Drive level: 90

Press Tune and set the Drive

Select settings again, then Sound Card. Here you will select the sound card interface, and check/adjust the drive level. Note the tip on adjusting drive for about 1/3 scale on the ALC meter.

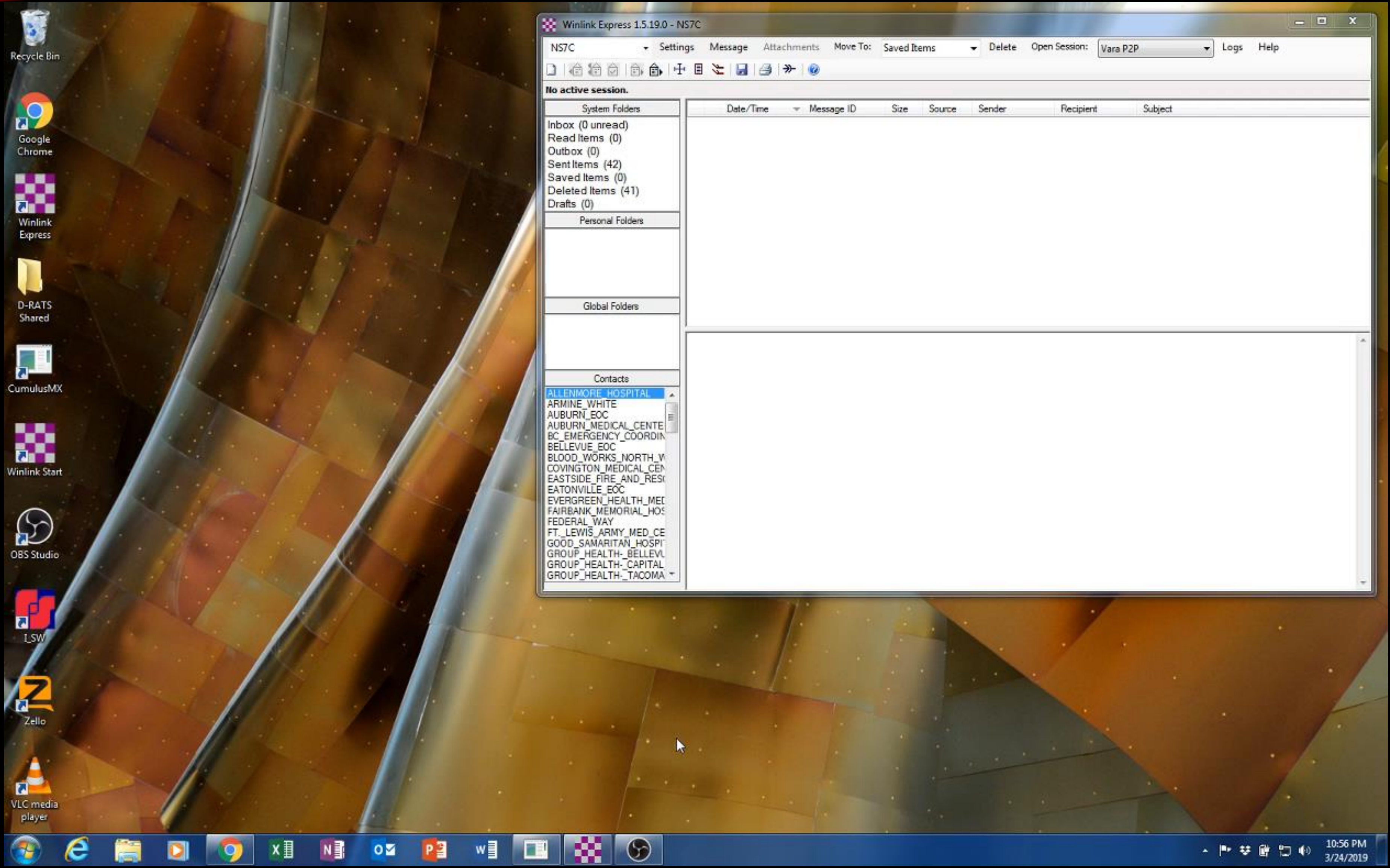
ARDOP DEMO



Winlink Express 1.5.19.0 - NS7C

No active session.

VARA DEMO



Winlink Express 1.5.19.0 - NS7C

NS7C

Move To: Saved Items

Open Session: Vara P2P

No active session.

System Folders

Inbox (0 unread)
Read Items (0)
Outbox (0)
Sent Items (42)
Saved Items (0)
Deleted Items (41)
Drafts (0)

Personal Folders

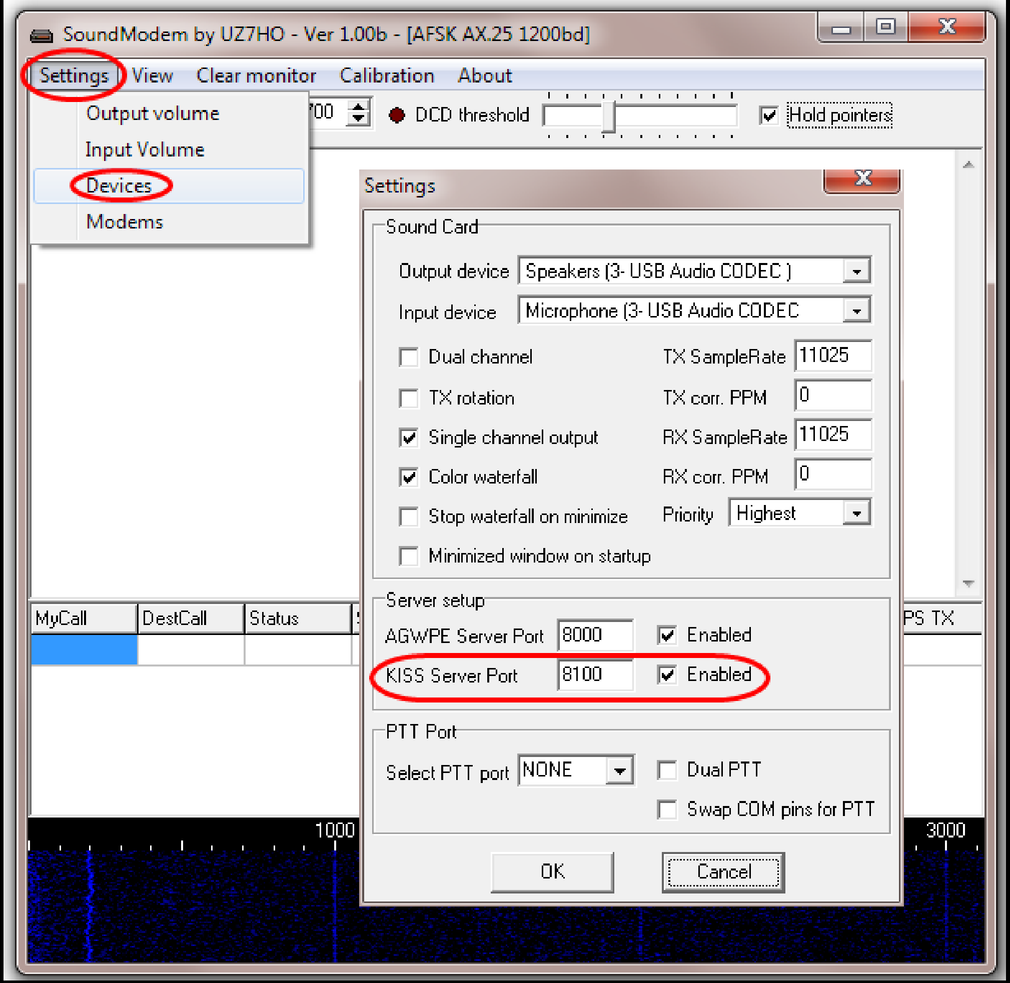
Global Folders

Contacts

ALLENMORE_HOSPITAL
ARMINE_WHITE
AUBURN_EOC
AUBURN_MEDICAL_CENTE
BC_EMERGENCY_COORDIN
BELLEVUE_EOC
BLOOD_WORKS_NORTH_W
COVINGTON_MEDICAL_CEN
EASTSIDE_FIRE_AND_RES
EATONVILLE_EOC
EVERGREEN_HEALTH_MED
FAIRBANK_MEMORIAL_HOS
FEDERAL_WAY
FT._LEWIS_ARMY_MED_CE
GOOD_SAMARITAN_HOSPI
GROUP_HEALTH-_BELLEVU
GROUP_HEALTH-_CAPITAL
GROUP_HEALTH-_TACOMA

SOFTWARE SETUP

PACKET V/UHF



Output device: Speakers (3- USB Audio CODEC)

Input device: Microphone (3- USB Audio CODEC

☐ Dual channel

☐ TX rotation

☑ Single channel output

☑ Color waterfall

☐ Stop waterfall on minimize

☐ Minimized window on startup

TX SampleRate: 11025

TX corr. PPM: 0

RX SampleRate: 11025

RX corr. PPM: 0

Priority: Highest

AGWPE Server Port: 8000 ☑ Enabled

KISS Server Port: 8100 ☑ Enabled

Select PTT port: NONE

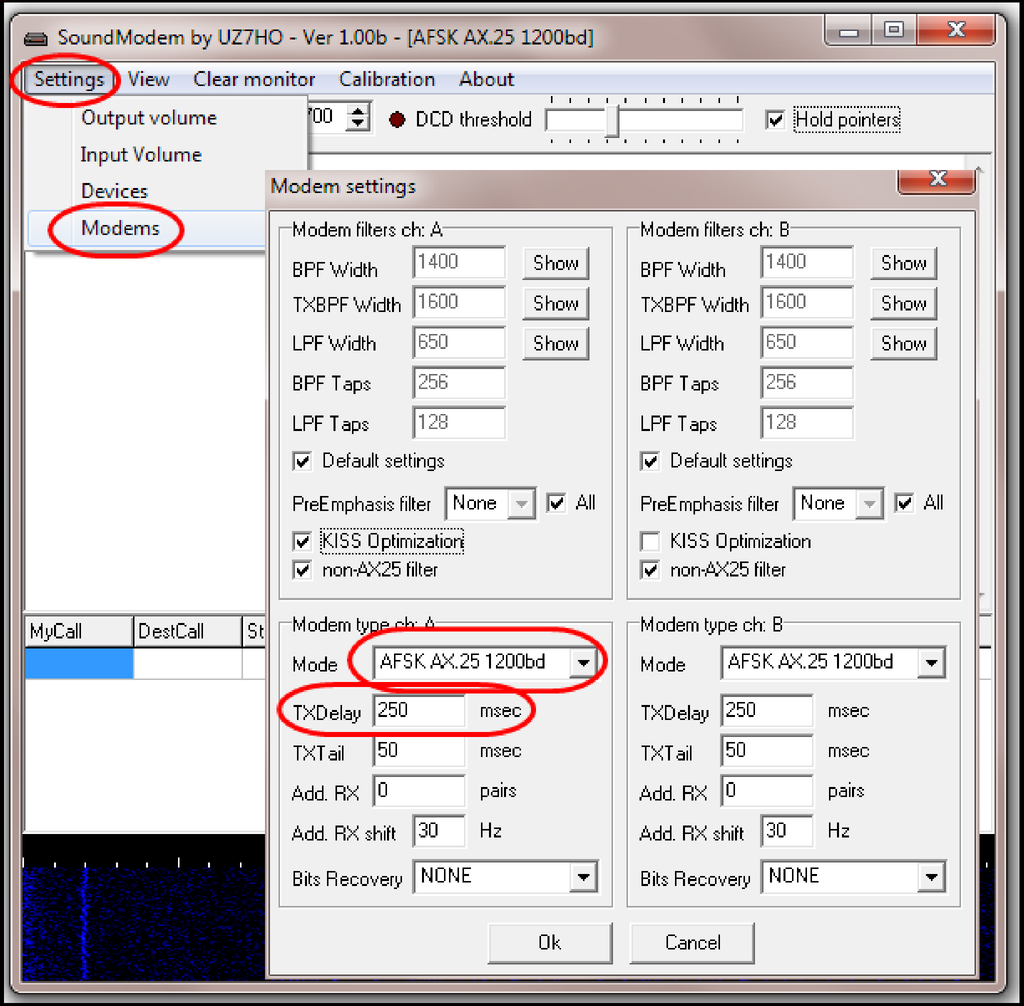
☐ Dual PTT

☐ Swap COM pins for PTT

Download and unzip UZ7HO Soundmodem (or HS Soundmodem for High Speed modes). Start soundmodem. (**Note**, Winlink Express does not start it for you, use a batch file) Select Settings then Devices. Select the sound card interface input and output and enable the KISS port (or both ports). Port numbers must not conflict with other applications, defaults should be OK. These settings are good for Signalink, other interfaces may need PTT options.

SOFTWARE SETUP

PACKET V/UHF



Modem filters ch: A

BPF Width 1400

TXBPF Width 1600

LPF Width 650

BPF Taps 256

LPF Taps 128

☑ Default settings

PreEmphasis filter None ☑ All

☑ KISS Optimization

☑ non-AX25 filter

Modem filters ch: B

BPF Width 1400

TXBPF Width 1600

LPF Width 650

BPF Taps 256

LPF Taps 128

☑ Default settings

PreEmphasis filter None ☑ All

☐ KISS Optimization

☑ non-AX25 filter

Modem type ch: A

Mode AFSK AX.25 1200bd

TXDelay 250 msec

TXTail 50 msec

Add. RX 0 pairs

Add. RX shift 30 Hz

Bits Recovery NONE

Modem type ch: B

Mode AFSK AX.25 1200bd

TXDelay 250 msec

TXTail 50 msec

Add. RX 0 pairs

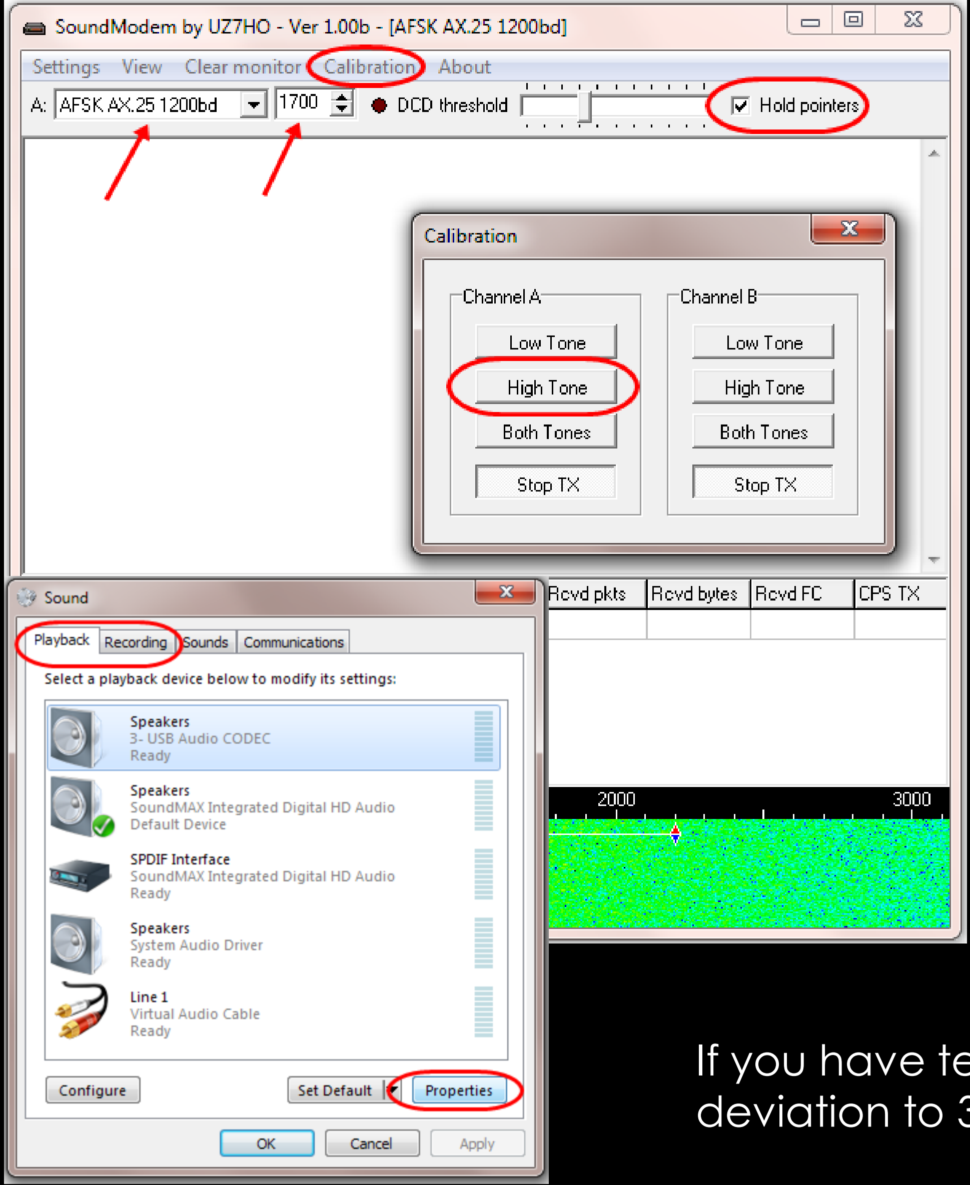
Add. RX shift 30 Hz

Bits Recovery NONE

Select Settings again, then Modems. Set the mode and TXDelay here. Other settings shown are good for Signalink, the ch:B side is not used.

SOFTWARE SETUP

PACKET V/UHF


SoundModem by UZ7HO - Ver 1.00b - [AFSK AX.25 1200bd]

A: AFSK AX.25 1200bd

1700

☑ Hold pointers

Select a playback device below to modify its settings:

Speakers
3- USB Audio CODEC
Ready

Speakers
SoundMAX Integrated Digital HD Audio
Default Device

SPDIF Interface
SoundMAX Integrated Digital HD Audio
Ready

Speakers
System Audio Driver
Ready

Line 1
Virtual Audio Cable
Ready

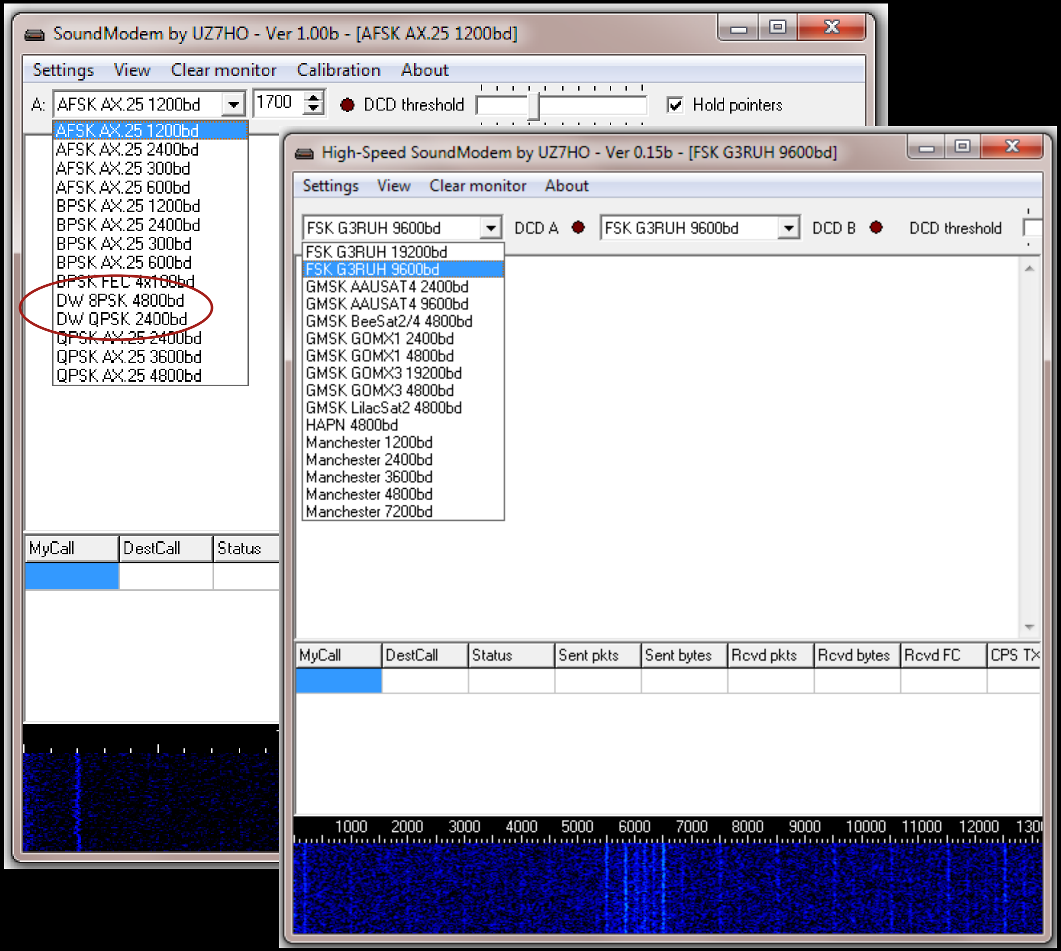
On the main screen check that the correct modem is selected, and that the correct filter center frequency is set, then check Hold Pointers. Use the Calibrate function to set transmit deviation with the High Tone. On Signalink, adjust the TX level. Set the RX level for green waterfall on squelch noise, and set the Delay control all the way down (fully CCW). It may be necessary to adjust the Windows Playback and Recording levels to achieve proper levels in soundmodem.

Soundmodem is now ready to connect with Winlink Express.

If you have test equipment available, set deviation to 3.5kHz on 1200, 2.5kHz on 9600

SOFTWARE SETUP

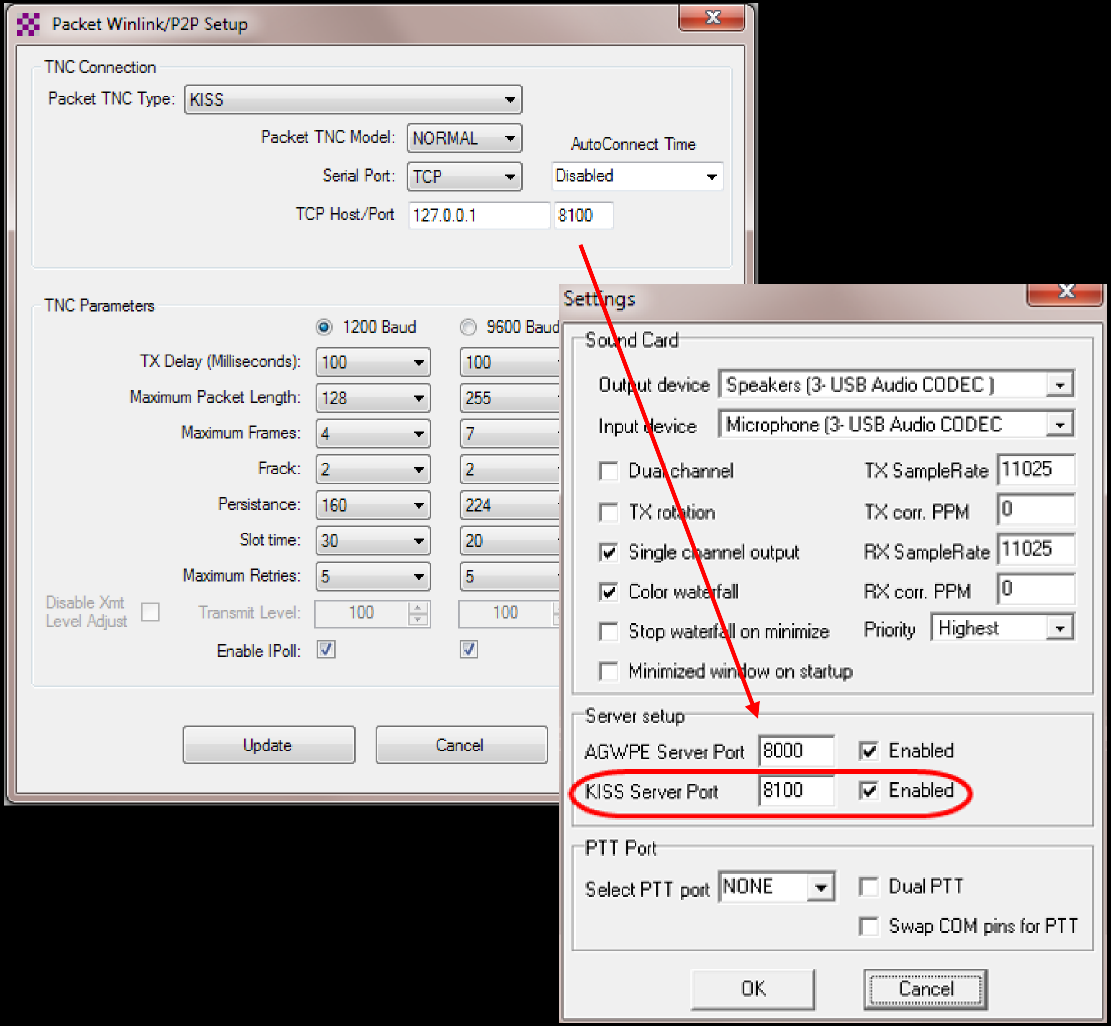
PACKET V/UHF



Soundmodem and HS Soundmodem have many different speed modems built-in, good for experimenting. Note the DW 2400 and DW 4800 modes, these are compatible with Direwolf (AFSK AX.25 1200bd and FSK G3RUH 9600bd are also compatible with Direwolf and hardware TNCs).

SOFTWARE SETUP

PACKET V/UHF



Packet Winlink/P2P Setup

TNC Connection

Packet TNC Type: KISS

Packet TNC Model: NORMAL

AutoConnect Time: Disabled

Serial Port: TCP

TCP Host/Port: 127.0.0.1 8100

TNC Parameters

	● 1200 Baud	○ 9600 Baud
TX Delay (Milliseconds):	100	100
Maximum Packet Length:	128	255
Maximum Frames:	4	7
Frack:	2	2
Persistance:	160	224
Slot time:	30	20
Maximum Retries:	5	5
Transmit Level:	100	100
Enable IPoll:	☑	☑

Disable Xmt Level Adjust ☐

Settings

Sound Card

Output device: Speakers (3- USB Audio CODEC)

Input device: Microphone (3- USB Audio CODEC

☐ Dual channel

☐ TX rotation

☑ Single channel output

☑ Color waterfall

☐ Stop waterfall on minimize

☐ Minimized window on startup

TX SampleRate: 11025

TX corr. PPM: 0

RX SampleRate: 11025

RX corr. PPM: 0

Priority: Highest

Server setup

AGWPE Server Port: 8000 ☑ Enabled

KISS Server Port: 8100 ☑ Enabled

PTT Port

Select PTT port: NONE

☐ Dual PTT

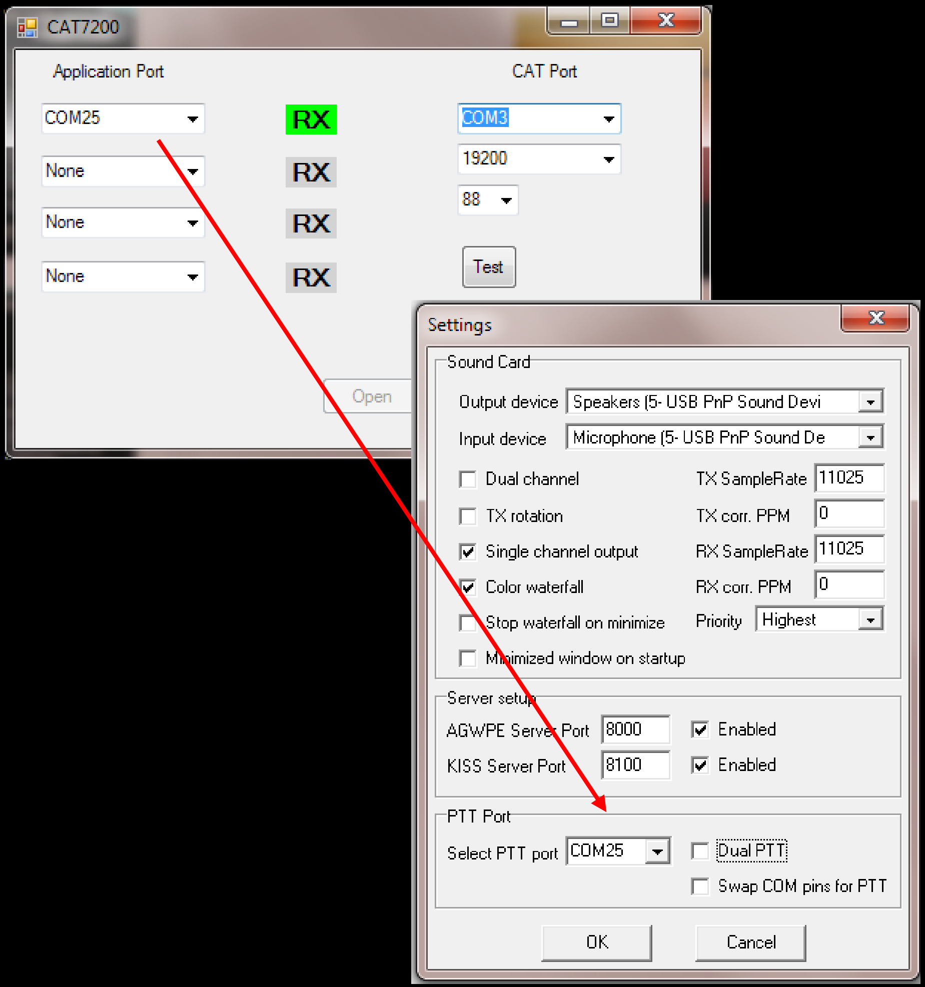
☐ Swap COM pins for PTT

Open a packet session and select Settings, set for a KISS TNC using TCP, and confirm that the port settings in the Packet Session and Soundmodem match.

Winlink Express and Soundmodem are now ready to operate. Note, Winlink Express will not start (or stop) Soundmodem automatically, this has to be done manually (or use a batch program).

SOFTWARE SETUP

PACKET V/UHF



CAT7200

Application Port: COM25, None, None, None

CAT Port: COM3, 19200, 88

Settings

Sound Card

Output device: Speakers (5- USB PnP Sound Devi

Input device: Microphone (5- USB PnP Sound De

☐ Dual channel

☐ TX rotation

☑ Single channel output

☑ Color waterfall

☐ Stop waterfall on minimize

☐ Minimized window on startup

TX SampleRate: 11025

TX corr. PPM: 0

RX SampleRate: 11025

RX corr. PPM: 0

Priority: Highest

Server setup

AGWPE Server Port: 8000 ☑ Enabled

KISS Server Port: 8100 ☑ Enabled

PTT Port

Select PTT port: COM25

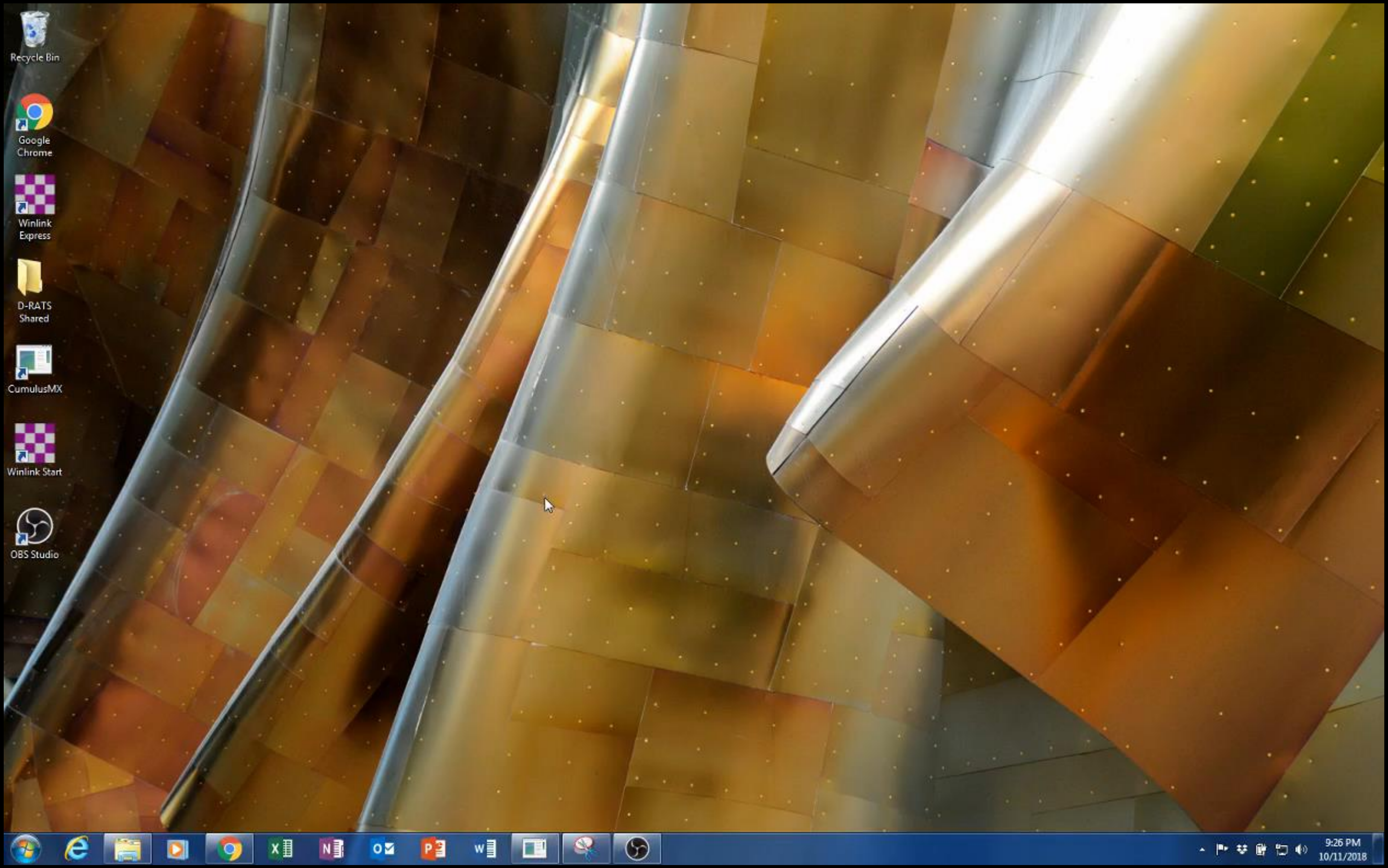
☐ Dual PTT

☐ Swap COM pins for PTT

The PTT Problem:
Signalink uses VOX to activate PTT. Rigs with built-in sound cards, or interfaces that do not implement VOX need a different solution.

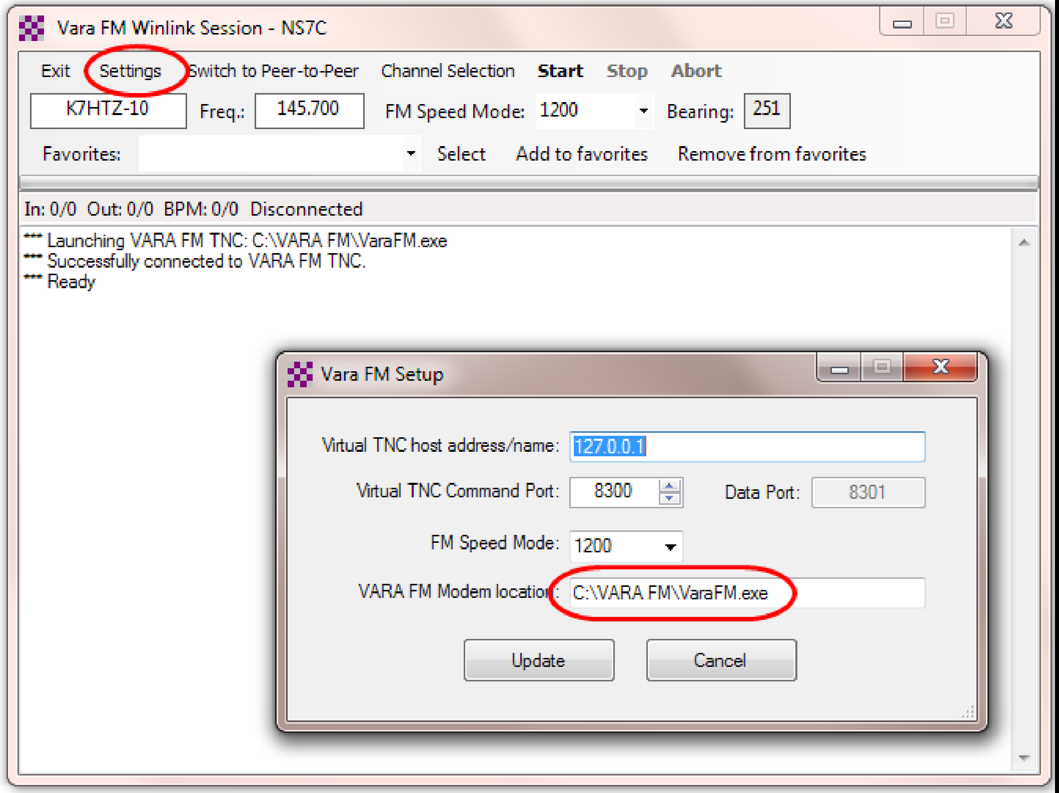
CAT7200 (no longer named appropriately) can provide a solution. CAT7200 creates a Virtual COM Port that applications can use to activate PTT. It then will send the appropriate CI-V/CAT commands to a rig, or will activate GPIO lines to assert PTT. This is a more complicated setup (3 programs are required, Winlink Express, CAT7200 and Soundmodem), but does provide a solution.

PACKET DEMO


Recycle Bin
Google Chrome
Winlink Express
D-RATS Shared
CumulusMX
Winlink Start
OBS Studio
9:26 PM
10/11/2018

SOFTWARE SETUP

VARA FM V/UHF



Vara FM Winlink Session - NS7C

K7HTZ-10 Freq.: 145.700 FM Speed Mode: 1200 Bearing: 251

Favorites:

In: 0/0 Out: 0/0 BPM: 0/0 Disconnected

```
*** Launching VARA FM TNC: C:\VARA FM\VaraFM.exe
*** Successfully connected to VARA FM TNC.
*** Ready
```

Vara FM Setup

Virtual TNC host address/name: 127.0.0.1

Virtual TNC Command Port: 8300 Data Port: 8301

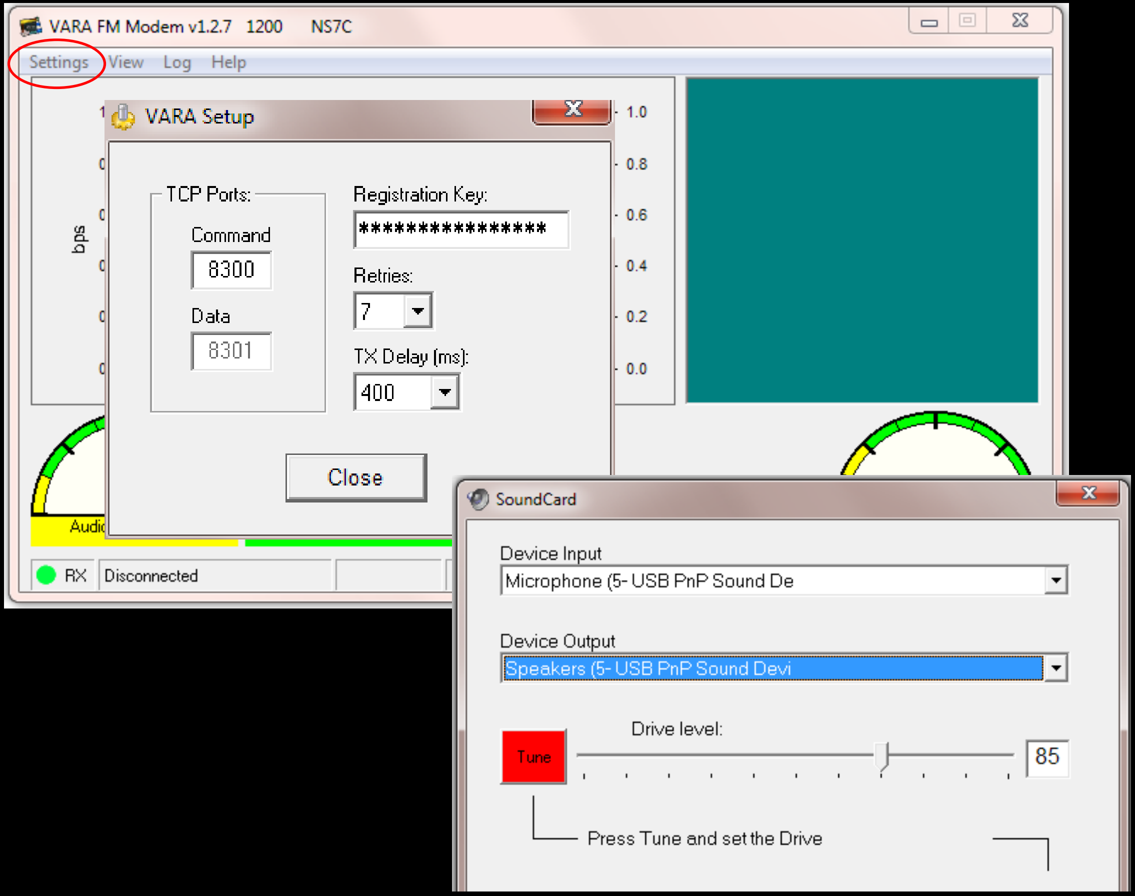
FM Speed Mode: 1200

VARA FM Modem location: C:\VARA FM\VaraFM.exe

Open a Vara FM session and select Settings. If Vara FM is not found on the computer in the default location, you will be given a link to the download page for Vara FM. Check the host and port settings. Vara FM can run in two speed modes, 1200 and 9600. These correspond to the1200 and 9600 options on the radio. Choose the appropriate setting based on the radio capabilities.

SOFTWARE SETUP

VARA FM V/UHF



VARA FM Modem v1.2.7 1200 NS7C

VARA Setup

TCP Ports:

Command: 8300

Data: 8301

Registration Key: ****************

Retries: 7

TX Delay (ms): 400

SoundCard

Device Input: Microphone (5- USB PnP Sound De

Device Output: Speakers (5- USB PnP Sound Devi

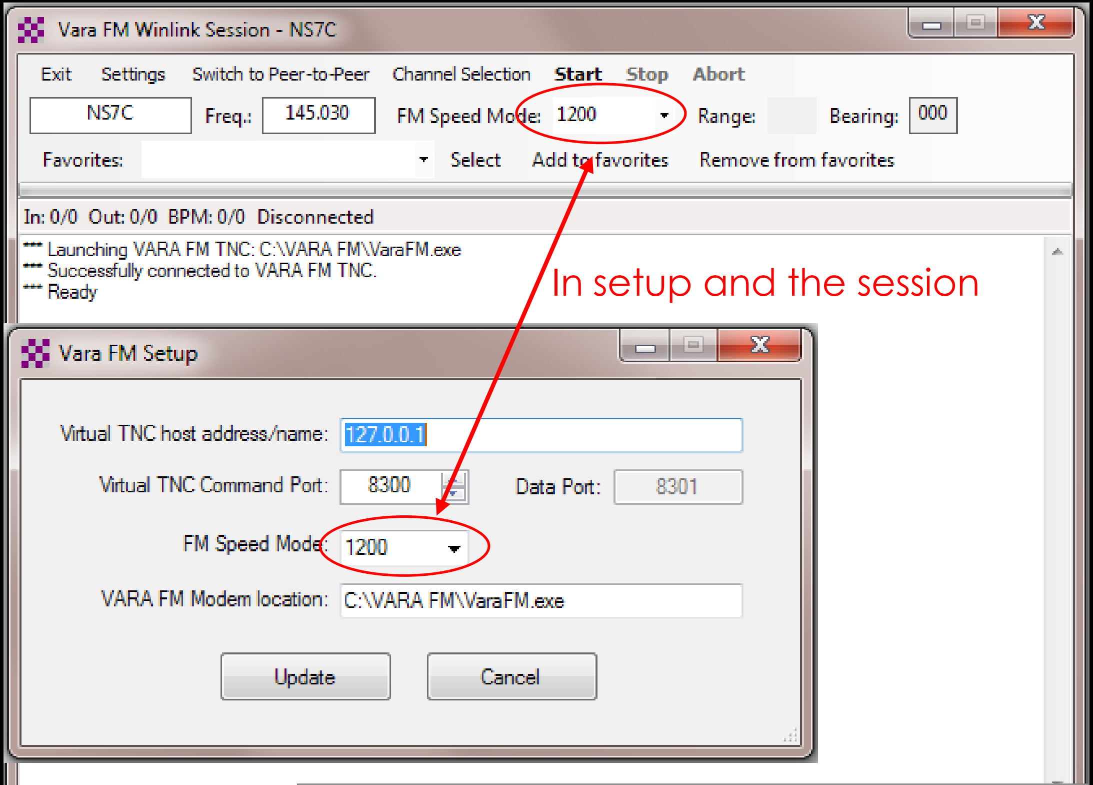
Drive level: 85

Press Tune and set the Drive

On the Vara FM modem, select Settings and Vara setup. Like Vara HF, check the TCP ports, and enter the registration key. TX Delay of 400 is a good starting point. Select settings then Sound Card and select the sound card interface input and output, click on Tune and adjust the drive as needed.

SOFTWARE SETUP

VARA FM V/UHF



Vara FM Winlink Session - NS7C

NS7C Freq.: 145.030 FM Speed Mode: 1200 Range: Bearing: 000

Favorites:

In: 0/0 Out: 0/0 BPM: 0/0 Disconnected

```
*** Launching VARA FM TNC: C:\VARA FM\VaraFM.exe
*** Successfully connected to VARA FM TNC.
*** Ready
```

In setup and the session

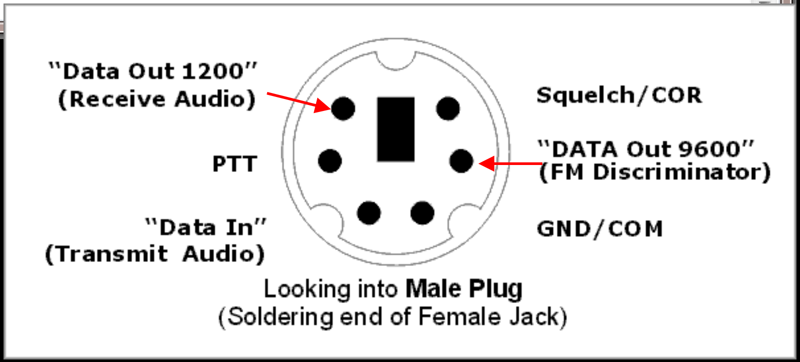
Vara FM Setup

Virtual TNC host address/name: 127.0.0.1

Virtual TNC Command Port: 8300 Data Port: 8301

FM Speed Mode: 1200

VARA FM Modem location: C:\VARA FM\VaraFM.exe



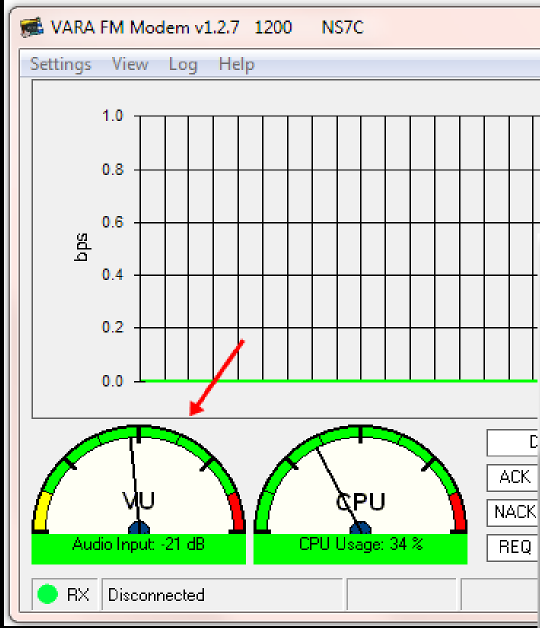
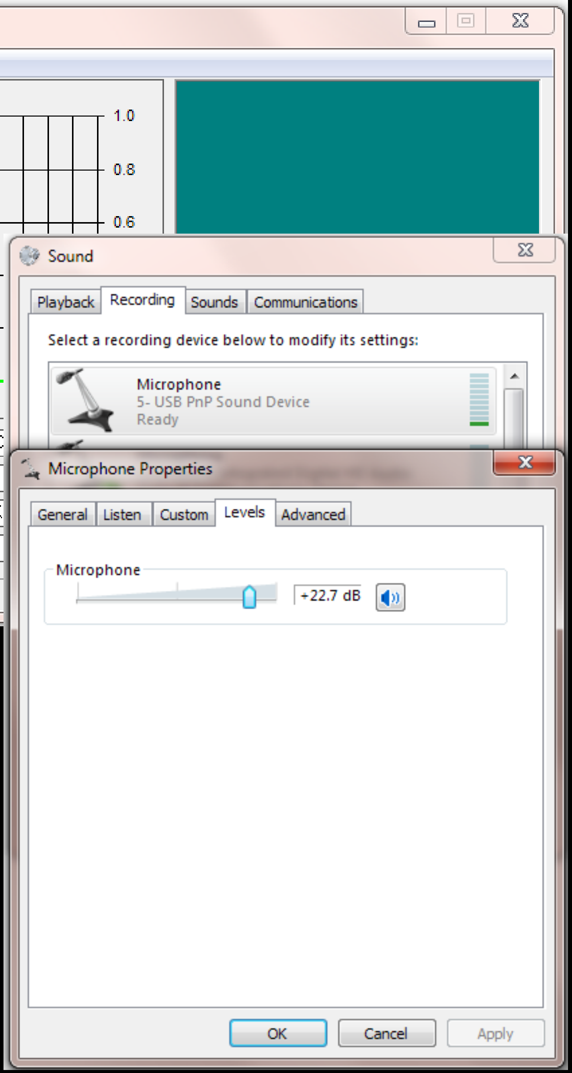
Looking into **Male Plug**
(Soldering end of Female Jack)

Vara FM has two speed modes that are selectable within Winlink Express. 1200 mode can be used with limited bandwidth radio connections like speaker and microphone, or the 1200 pin on the data connector. 9600 mode requires more badwidth and must use the 9600 connection on the data connector. 9600 will also need to be set in the radio menus. The speed mode can be set in the setup menu, on the session screen, and also in the channel selector.

Top speed on 1200 is 8,532bps
Top speed on 9600 is 17,957bps

SOFTWARE SETUP

VARA FM V/UHF

Audio Input: -21 dB

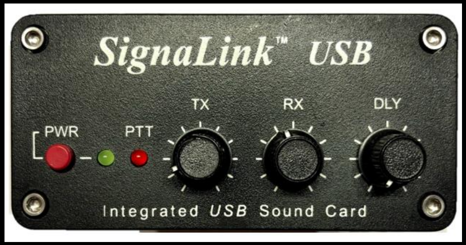
CPU Usage: 34 %

RX Disconnected

Select a recording device below to modify its settings:

Microphone
5- USB PnP Sound Device
Ready

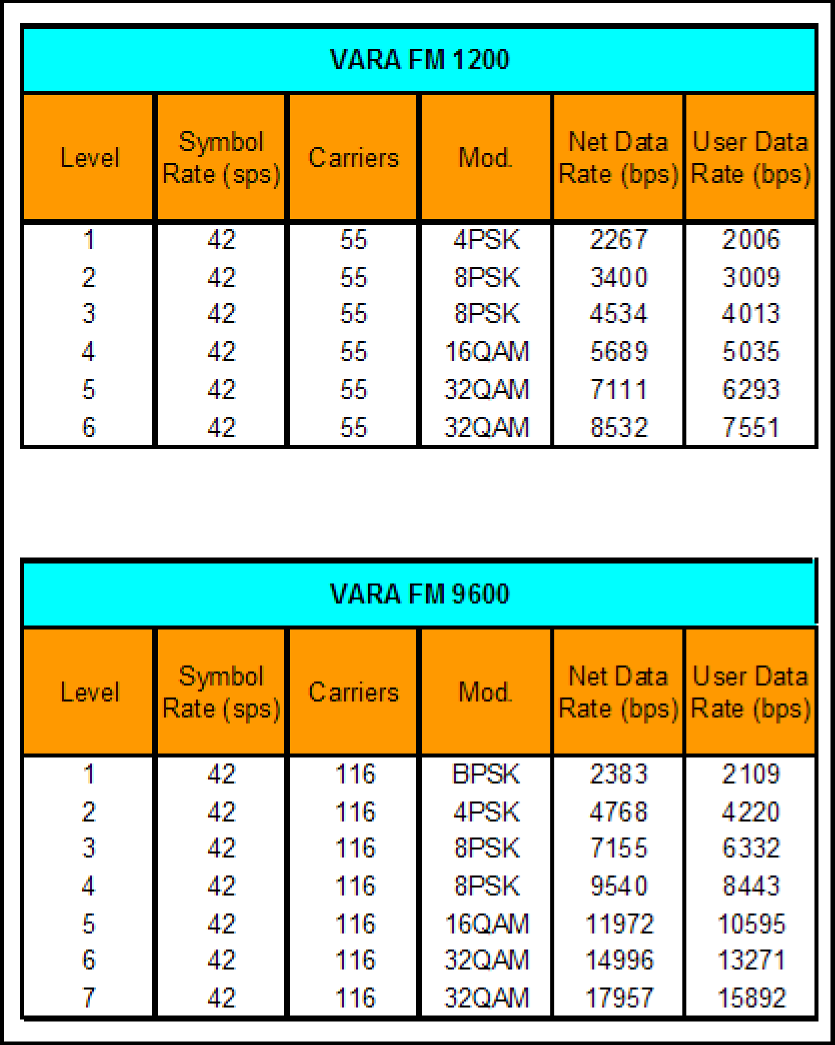
Microphone +22.7 dB



The Vara FM input level should be in the 50-75% range. Transmit audio should be 3.5kHz on 1200 and 2.5kHz on 9600 (much more drive is needed for 9600). Adjust the TX and RX levels on the Signalink, and/or the Windows mixer to achieve these levels. Some experimenting will be needed to achieve top performance. Document these settings for future reference or for resetting them after changing modes.

SOFTWARE SETUP

VARA FM V/UHF



VARA FM 1200

Level	Symbol Rate (sps)	Carriers	Mod.	Net Data Rate (bps)	User Data Rate (bps)
1	42	55	4PSK	2267	2006
2	42	55	8PSK	3400	3009
3	42	55	8PSK	4534	4013
4	42	55	16QAM	5689	5035
5	42	55	32QAM	7111	6293
6	42	55	32QAM	8532	7551

VARA FM 9600

Level	Symbol Rate (sps)	Carriers	Mod.	Net Data Rate (bps)	User Data Rate (bps)
1	42	116	BPSK	2383	2109
2	42	116	4PSK	4768	4220
3	42	116	8PSK	7155	6332
4	42	116	8PSK	9540	8443
5	42	116	16QAM	11972	10595
6	42	116	32QAM	14996	13271
7	42	116	32QAM	17957	15892

Vara FM uses a very efficient FEC protocol, resulting in a significant speed improvement over traditional Packet Radio (nearly 2X 9600 packet). It will shift to the different speed levels automatically based on the receive signal quality.

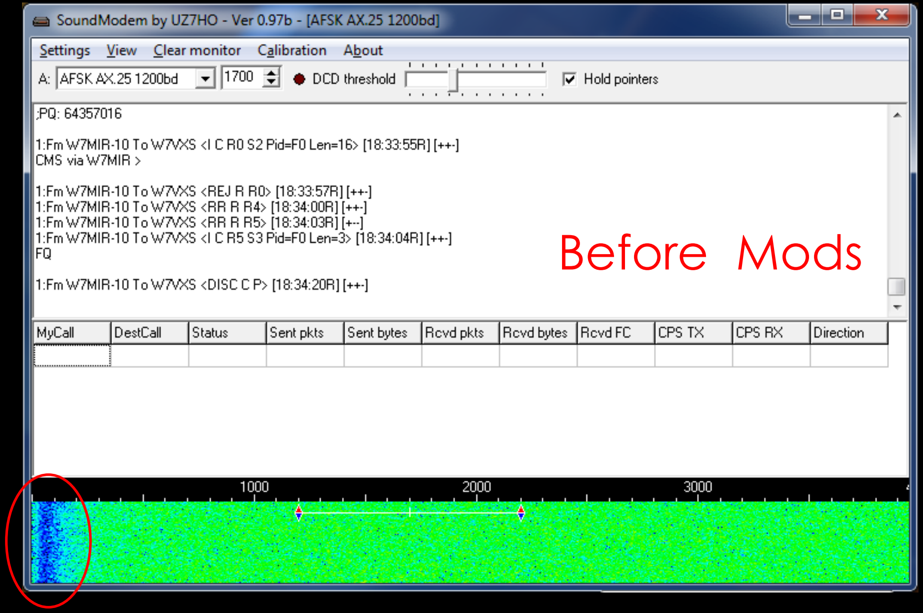
Vara FM 1200 can also be used over regular voice repeaters or cross-band repeaters (at somewhat slower rates).

Unlike Packet, Vara FM does not support store-and-forward systems like digipeaters and nodes. It will be used for point-to-point links to gateways or peer-to-peer partners.

CONCLUSION

- Winlink use continues to grow, especially for EmComm use
- The Winlink Development Team continues to enhance capabilities to adapt to changing needs
- Steady improvements are being implemented
- Sound card interfaces and modes provide low cost and high performance solutions to data transfer over RF

BONUS



A: AFSK AX.25 1200bd 1700 ☑ Hold pointers

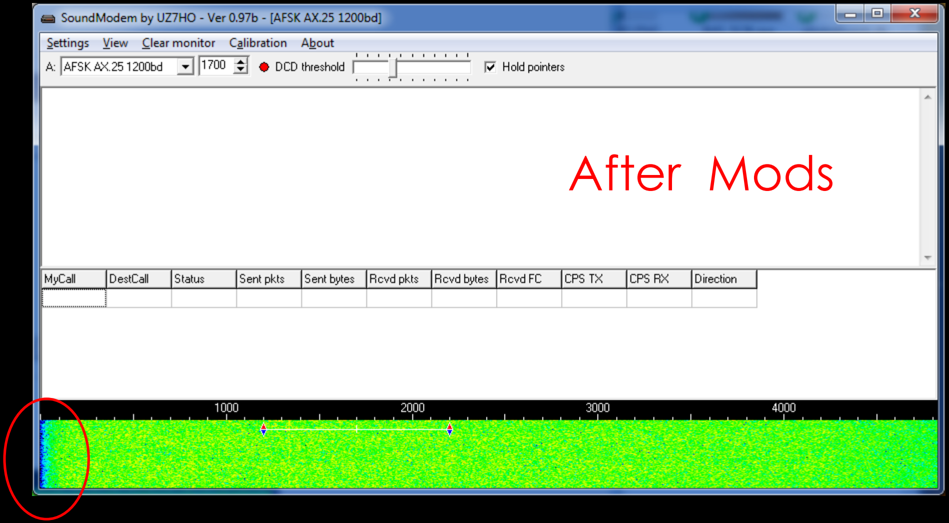
```
;PQ: 64357016

1:Fm W7MIR-10 To W7VXS <I C R0 S2 Pid=F0 Len=16> [18:33:55R] [++-]
CMS via W7MIR >

1:Fm W7MIR-10 To W7VXS <REJ R R0> [18:33:57R] [++-]
1:Fm W7MIR-10 To W7VXS <RR R R4> [18:34:00R] [++-]
1:Fm W7MIR-10 To W7VXS <RR R R5> [18:34:03R] [+--]
1:Fm W7MIR-10 To W7VXS <I C R5 S3 Pid=F0 Len=3> [18:34:04R] [++-]
FQ

1:Fm W7MIR-10 To W7VXS <DISC C P> [18:34:20R] [++-]
```

Before Mods



A: AFSK AX.25 1200bd 1700 ☑ Hold pointers

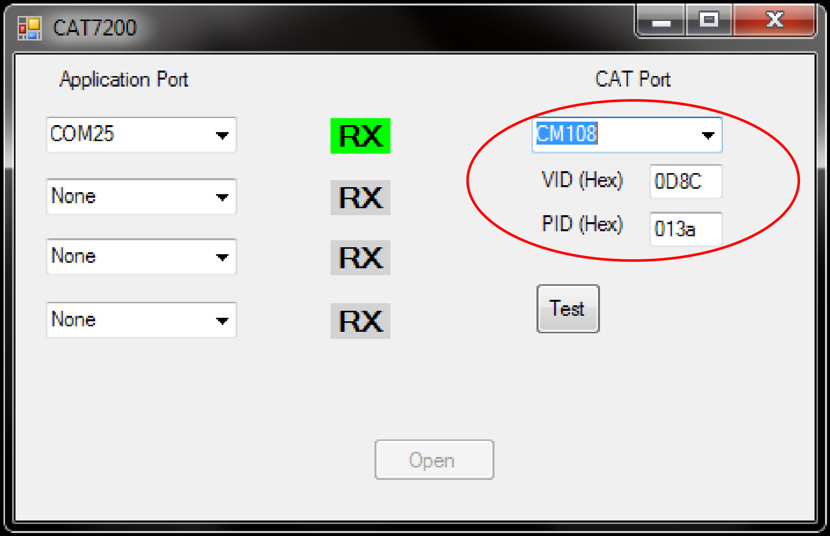
After Mods

Signalink Modifications to improve performance:

- New Transformers
- Change OpAmp BIAS
- Filter USB power bus
- Fix power switch

http://www.frenning.dk/OZ1PIF_HOMEPAGE/SignaLinkUSB-mods.html

BONUS


CAT7200

Application Port

COM25

None

None

None

CAT Port

CM108

VID (Hex) 0D8C

PID (Hex) 013a

CAT7200 for PTT support on all-mode HF radios, and interfaces that use C-Media codecs:

CAT7200 creates a Virtual Com Port (VCP) that applications can use to activate PTT. It then sends CI-V/CAT commands to the rig to set PTT.

A special version also has support for the GPIO pins on C-Media sound cards. This allows use of inexpensive interfaces based on the AllStar repeater system.

http://www.cantab.net/users/john.wiseman/Documents/CAT7200.html

BONUS

```
@echo off
REM Edit this file and uncomment (remove the REM
REM) the lines for desired software TNC
REM application.
REM Edit the folder locations if you stored the
REM programs in a folder other than C:\Ham
REM Save this file to the desktop, and just double
REM click it to run, or better yet
REM save the file to a folder (like C:\Ham), then
REM create a desktop shortcut that points to this
REM file.
REM You can then change the shortcut
REM properties to run minimized, and
REM also change the icon, browse to the C:\RMS
REM Express folder and select the RMS Express Icon.

start "Soundmodem" "C:\Ham\Soundmodem\soundmodem.exe"
REM start "Direwolf" "C:\Ham\Direwolf\direwolf.exe"
start /wait "Winlink Express" "C:\RMS Express\RMS Express.exe"
taskkill /im soundmodem.exe
REM taskkill /im direwolf.exe
exit
```

Since Winlink Express does not start (or stop) external Packet software TNC applications, use a batch program similar to this to start the TNC, and then start Winlink Express. When Winlink Express ends, the software TNC will stop too. This prevents orphaned programs, and starting more than one instance of the software TNC.

CONTACT

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